UNESCO-IHE
Institute for Water Education

A.K. Chapagain
A.Y. Hoekstra

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Virtual water flows between nations in relation to trade in livestock and livestock products

Value of Water

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UNESCO-IHE
P.O. Box 3015
2601 DA Delft
The Netherlands

Contact author:
Arjen Hoekstra
Phone   +31 15 215 18 28
E-mail   a.hoekstra@unesco-ihe.org

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Summary

The virtual water content of a commodity is the volume of water used to produce this commodity. International trade in food implies international flows of virtual water. For water-scarce countries it can be attractive to import virtual water (through import of water-intensive products), thus relieving the pressure on the domestic water resources.

This study aims to develop a methodology to assess the virtual water content of various types of livestock and livestock products and to quantify the virtual water flows related to the international trade in livestock and its products. The results are then combined with the estimates of virtual water trade flows associated with international crop trade as reported in Hoekstra and Hung (2002, 2003), to get a comprehensive picture of the international virtual water flows. The study covers the period from 1995 to 1999.

First, the virtual water content (m^3/ton) of live animals is calculated, based on the virtual water content of their feed and the volumes of drinking and service water consumed during their lifetime. Second, the virtual water content is calculated for each livestock product, taking into account the product fraction (ton of product obtained per ton of live animal) and the value fraction (ratio of value of one product from an animal to the sum of the market values of all products from the animal). Finally, virtual water flows between nations are derived from statistics on international product trade and virtual water content per product.

The global volume of international virtual water flows is estimated to be 1031 Gm^3 per year (695 Gm^3/yr from the trade in crops and 336 Gm^3/yr from trade in livestock and livestock products). This means that about 20% of the global water use in agriculture is aimed at producing products for export. The countries with the largest net virtual water export are: the United States, Australia, Canada, Argentina and Thailand. The countries with the largest net virtual water import are: Japan, Sri Lanka, Italy, South Korea and the Netherlands.

The total water use within a country itself is not the correct measure of a nation's actual appropriation of global water resources. In the case of net import of virtual water into a country this virtual water volume should be added to the total water use within the country, in order to get a picture of a nation's real call on the global water resources. Similarly, in the case of net export of virtual water from a country this virtual water volume should be subtracted from the volume of internal water use. The total of internal water use and net virtual water import can be seen as the 'water footprint' of a country, the total volume of *water* needed to produce the goods and services consumed by the inhabitants of the country. This concept is analogous to the 'ecological footprint' of a nation, a concept that refers to the amount of *land* needed to produce the goods and services consumed by the inhabitants of a country. This study calculates the water footprint for each nation of the world. This study does not yet include green water use within the country. Future research on water footprints should include this part of water use as well, to get a more realistic figure.

1.   Introduction

1.1.   The concept of virtual water

Since the Dublin conference in 1992 it is widely accepted that water is a scarce resource that should be treated as an economic good. Efficiency in water use can be categorised at three broad levels (Hoekstra and Hung, 2002). The lowest level is the user level, where efficiency can be improved by adopting water-saving technologies and by measures such as water pricing, awareness raising etc. The second level of efficiency relates to the allocation and re-allocation of water resources to specific higher-value uses, and more equitable use by all stakeholders. Generally efficiency at this level is achieved through government interventions in the form of different policies in the water sector. The highest level of efficiency concerns the trade in water. As water is quite a bulky item to transport, trading water in its actual form is costly, which is where the concept of virtual water comes into the picture.

The term 'virtual water' was introduced by Tony Allan in the early 1990s (Allan, 1993; 1994). It is defined as the volume of water required to produce a commodity or service (Allan, 1998, 1999; Hoekstra, 1998). When there is a transfer of products or services from one place to another, there is little direct physical transfer of water (apart from the water content of the product, which is quite insignificant in terms of volume). There is however a significant transfer of virtual water. From a country's perspective, Haddadin (2003) has defined this water also as 'exogenous water'.

More precisely, the term virtual water can be defined from two distinct approaches. One is from the *production point of view* and the other from the *consumption point of view* (Hoekstra, 2003). The first approach quantifies virtual water as the *real water* used in the production of the commodity. It is *production site specific*, as it depends on the production conditions, including place and time of production and local water use efficiency. In the second approach, the virtual water content is defined as the amount of water that would have been required to produce the product in the place where the product is used. Hence it is *consumption site specific*. The second concept is particularly useful if we think of how much water we can save by importing a commodity instead of producing it ourselves. In the current study we adopt the first definition of virtual water, which has the advantage that it has a straightforward empirical basis.

To produce one kilogram of grain, grown under rain-fed and favourable climatic conditions (say in the Netherlands or Canada), we need about one to two cubic metres of water, that is 1000 to 2000 kg. For the same amount of grain grown in an arid country (say in Egypt or Israel), where the climatic conditions are less favourable (high temperature, high evapotranspiration), we need up to 3000 to 5000 kg. Livestock and livestock products are more water intensive. Roughly, livestock products contain 5 to 20 times more virtual water per kg than crop products.

Not only agricultural products contain virtual water – most studies to date have been limited to the study of virtual water in crops – but industrial products and services also contain virtual water.

1.2. Virtual water flows between nations

For a water-scarce region it can be attractive to adopt a policy of producing and exporting products with relatively low virtual water content and importing products having higher virtual water content. The volume of virtual water embodied in food imports and exports will remain a valid concern for water-short nations seeking to maximise the value of their limited water supplies. The labour, land and capital incorporated in the products must also be considered in countries where one or more of those resources is limited (Wichelns, 2001). The volume of the virtual water flow between two nations depends upon the virtual water content of the product traded and the physical volume of trade.

Virtual water flows between nations in relation to the international trade in crops have been quantified by Hoekstra and Hung (2002, 2003). A rapid assessment of the virtual water flows between nations in relation international trade in livestock and livestock products was done by Chapagain and Hoekstra (2003). The current study can be seen as an improvement to the latter rapid assessment. The major improvements concern the collection of more accurate basic data.

1.3. Objectives of the study

The main objective of the current study is to assess the volumes of international virtual water flows from the trade in livestock and livestock products during the five separate years from 1995 to 1999. We first estimate the virtual water content of different kinds of livestock and their products. After having estimated the virtual water flows related to trade in livestock and livestock products, we show the complete picture of global virtual water flows by including the earlier assessments by Hoekstra and Hung (2002) of virtual water flows related to international trade in crops.

2.   Method

2.1.   Overview

The international virtual water flows related to the trade in livestock and livestock products are calculated by multiplying trade volumes (ton/yr) with their virtual water content (m^3/ton). It is necessary to first assess the virtual water content of a live animal and then distribute this among the different products from the animal. We distinguish n_p products, which originate from n_a kinds of animal. Each individual product comes from one and only one particular kind of animal. For simplification it is assumed here that a livestock product exported from a certain country is actually fully produced within that country, with the animal feeding, drinking and living on domestic resources.

2.2.   Calculation of the virtual water content of live animals

2.2.1. The three components of the virtual water content of a live animal

The virtual water content of an animal at the end of its life span is defined as the total volume of water that was used to grow and process its feed, to provide its drinking water, and to clean its housing and the like. There are three components to the virtual water content of a live animal:

$$VWC_a[e,a] = VWC_{feed}[e,a] + VWC_{drink}[e,a] + VWC_{serv}[e,a]$$

(1)

where $VWC_a[e,a]$ represents the virtual water content of animal a in exporting country e expressed in cubic metres of water per ton of live animal. VWC_{feed}, VWC_{drink} and VWC_{serv} are the virtual water contents from feeding, drinking and servicing respectively. We express all components in terms of cubic metres of water per ton of live animal.

2.2.2. Virtual water content from feed consumed

The virtual water content of an animal from the feed consumed has two parts. The first is the actual water that is required to prepare the feed mix and the second is the virtual water incorporated in the various feed ingredients. The virtual water content from feeding an animal at the end of its life span is calculated as follows:

$$VWC_{feed}[e,a] = \frac{\int_{birth}^{slaughter} \left\{ q_{mixing}[e,a] + \sum_{c=1}^{n_c} SWD[e,c] \times C[e,a,c] \right\} dt}{W_a[e,a]}$$

(2)

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Here VWC_{feed}[e,a] is expressed in cubic metres of water per ton of live animal. The variable q_{mixing} [e,a] represents the volume of water required for mixing the feed of animal a in exporting country e (m^3/day). C[e,a,c] is the quantity of feed crop c consumed by animal a in exporting country e, expressed in tons per day. SWD[e,c] is the specific water demand of crop c in exporting country e, expressed in m^3 per ton of crop. W_a[e,a] is the average live weight of animal a in exporting country e at the end of its life span, expressed in tons.

The specific water demand of a crop is the volume of water required to produce a certain quantity of the crop and is expressed in m^3/ton. For each feed crop c, average specific water demand is calculated per country e:

$$SWD[e,c] = \frac{CWR[e,c]}{CY[e,c]}$$

(3)

Here CWR[e,c] represents the crop water requirement of crop c in country e (m^3/ha) and CY[e,c] the crop yield (ton/ha). In calculating the crop water requirements the CROPWAT model developed by the FAO is used. The climate data needed for the crop water requirement calculations are taken from the CLIMWAT database of the FAO. Other crop parameters are taken as in-built in the CROPWAT model. It uses the FAO Penman-Monteith equation to calculate the reference crop evapotranspiration (ET$_0$, mm/day). The crop evapotranspiration (ET$_c$, mm/day) is calculated using crop coefficients (K$_c$), also in-built within the CROPWAT model for each crop type. The CROPWAT model integrates the ET$_c$ value over the entire growing period to get the total water requirement of the crop. The crop yield data are taken from FAOSTAT.

2.2.3. Virtual water content from drinking water

The virtual water content of an animal originating from drinking is equal to the total volume of water used as drinking water supply, calculated over the entire life span of the animal. We express the virtual water content here in terms of volume of water per ton of live animal, and thus calculate the virtual water content from drinking as:

$$VWC_{drink}[e,a] = \frac{\int_{birth}^{slaughter} q_d[e,a]dt}{W_a[e,a]}$$

(4)

Here q_d[e,a] is the daily drinking water requirement of animal a in exporting country e (m^3/day). W_a[e,a] is the live weight of the animal at the end of its lifetime.

2.2.4. Virtual water content from service water

The virtual water content of an animal from the service water used is equal to the total volume of water used to clean the farmyard, wash the animal and other services necessary to maintain the environment during the entire life span of the animal. The virtual water content from service water is calculated as:

$$VWC_{serv}[e,a] = \frac{\int\limits_{birth}^{slaughter} q_{serv}[e,a]\,dt}{W_a[e,a]} \tag{5}$$

$VWC_{serv}[e,a]$ represents the virtual water content of animal a in exporting country e and is expressed in cubic metres of water per ton of live animal. $q_{serv}[e,a]$ is the daily service water requirement (m^3/day) of animal a in exporting country e.

2.3.   Calculation of the virtual water content of livestock products

2.3.1. Levels of production

Based on Section 2.2 we can calculate the full virtual water content of an animal. We would also like to know, however, what the virtual water content is of particular livestock products, such as meat, milk, cheese, butter, leather, etc. The virtual water content of a live animal contributes to the products from the animal. We have to distribute the virtual water content of a live animal in such a way among the animal products that neither double counting nor un-accounting occur. Double counting, for example, would happen if one were to first attribute the full virtual water content of a cow to its milk, and then later again to its meat.

In order to analyse in a systematic way we assume levels of production. The products derived directly from a live animal are called primary livestock products. For example, cows produce milk, a carcass and skin as their primary products. Some of these primary livestock products are then further processed into so-called secondary products, such as cheese and butter from the primary product milk and meat and sausage from the carcass.

2.3.2. First level of processing (primary products from live animals)

The virtual water content of a primary product includes (part of) the virtual water content of the live animal plus the processing water needed. The processing water requirement per ton of live animal is defined as:

$$PWR[e,a] = \frac{Q_{proc}[e,a]}{W_a[e,a]} \tag{6}$$

Here $PWR[e,a]$ is the processing water requirement per ton of live animal a for producing primary products in exporting country e (m^3/ton). $Q_{proc}[e,a]$ is the volume of processing water in m^3 per live animal a in exporting country e.

The total virtual water content of the live animal (VWC_a) and processing water requirement (PWR) should be attributed to the primary products per ton of live animal in a logical way. To do this we introduce two terms, 'product fraction' and 'value fraction'. The product fraction $pf[e,p]$ of product p in exporting country e is defined as the weight of the primary product obtained per ton of live animal (Chapagain and Hoekstra, 2003).

$$pf[e,p] = \frac{W_p[e,p]}{W_a[e,a]}$$

(7)

Here $W_p[e,p]$ is the weight of primary product p obtained from one live animal a in exporting country e. $W_a[e,a]$ is the live weight of animal a in exporting country e. Generally the product fraction is less than one, because the product is derived from just part of the animal. However, if a product is obtained during the lifetime of an animal, as in the case of milk and eggs, the pf can be greater than one (see Appendix IXa).

The value fraction, $vf[e,p]$, is the ratio of the market value of one product from the animal to the sum of the market values of all products from the animal.

$$vf[e,p] = \left[\frac{v[p] \times pf[e,p]}{\sum (v[p] \times pf[e,p])} \right]$$

(8)

The denominator is totalled over the primary products that originate from root animal a. The variable $v[p]$ is the market value of product p (US\$/ton). Hence, the virtual water content (VWC) of primary product p in m^3/ton is,

$$VWC_p[e,p] = (VWC_a[e,a] + PWR[e,a]) \times \frac{vf[e,p]}{pf[e,p]}$$

(9)

2.3.3. Second level of processing (secondary products from primary products)

The production of secondary products also requires some processing water. The virtual water content of a secondary product is composed of (part of) the virtual water content of the primary root product and the processing water consumed. In this case the processing water requirement, $PWR[e,p]$, is defined as the volume of water required to process one ton of primary product p into secondary products.

The product fraction, $pf[e,p]$, is now defined as the ratio of the weight of secondary product p obtained per ton of primary product in exporting country e. Similarly the value fraction $vf[e,p]$ is defined as the ratio of the market value of one secondary product to the total market value of all products from the primary product.

Hence, the virtual water content of secondary product p in m³/ton is calculated using the same approach as described for primary products (Equation 9). The difference is that here we take the virtual water content of the primary product and the water requirements for processing the primary products into secondary products as the basis.

In the same way we can calculate the virtual water content for tertiary products, etc. The first step is always to obtain the virtual water content of the input (root) product and the water necessary to process it. The total of these two elements is then distributed over the various output products, based on their product fraction and value fraction.

2.3.4. Illustration of the calculation of the virtual water content of 'bovine products'

The method to calculate the virtual water content of a live animal and its livestock products is illustrated here with a simple example of bovines producing a carcass, offal, semen and raw skin as primary products and carcass frozen, bovine cuts and meat cured as secondary products from the carcass, in an industrial farming system. In this group we deal with cows bred for beef production. The average data taken for the calculation are: live weight of a fully grown cow 545 kg, drinking water requirements for an adult cow 38 l/day/animal, for a calve of 5 months 5 l/day/animal, service water requirements for an adult cow 11 l/day/animal, for a calve of 5 months 2 l/day/animal, animal age at the time of slaughter 36 month.

For this sample calculation, the feed data for a calve and an adult cow are taken from the Canada Statistics Division (Statistics Canada, 2002). The *specific water demand* for different types of crop in Canada is taken from Hoekstra and Hung (2002). Mixing water requirement for feed preparation is assumed to be 50 per cent of the total volume of feed consumed. Assuming a linear growth in feed consumption with age until the start of adulthood, the average feed volumes are calculated. These feed volumes are then multiplied by the specific water demands of the corresponding crop types, to get the volume of virtual water consumed by the animal per day (see Appendix IXb).

The virtual water from feed, drinking and servicing is integrated over its life span to get the total virtual water content of a live animal, which is 5252 m³/animal. As the live weight of the animal is 0.545 ton, the virtual water content of bovine cattle in Canada is equivalent to 9636 m³/ton of live animal and if an animal ready to be slaughtered is traded alive the total virtual water traded is about 9636 m³/ton. The primary products of the animal are the carcass, offal, semen and raw skin. The *product fractions* and *value fractions* for these primary products are calculated in Table 2.1.

Table 2.1. Calculation of product fraction and value fraction of primary products from a bovine.

	Carcass	Offal	Semen	Skin
Product fraction, pf	0.52	0.07	0.0001	0.06
Market value (US$/ton)	3568	2013	83968	2230
Value obtained per ton of live animal (10^3 US$)	= 0.52x3568 = 1855	= 0.07 x 2013 = 141	= 0.0001 x 83968 = 8	= 0.06x2230 = 134
Total value obtained per ton of live animal (10^3 US$)	= 1855+141+8+134 = 2138			
Value fraction, vf	= 1855/2138 = 0. 87	= 141/2138 = 0.066	= 8/2138 = 0.0037	= 134/2138 = 0.063

The quantity of water used in the abattoir to process a bovine, the processing water requirement (*PWR*), is 10 m^3/ton of live weight of the animal. The virtual water contents of these primary products are calculated as:

$$VWC[carcass] = \left\lfloor \frac{(9636+10) \times 0.87}{0.52} \right\rfloor \qquad \cong 16100 \text{ m}^3/\text{ton}$$

$$VWC[offal] = \left\lfloor \frac{(9636+10) \times 0.066}{0.07} \right\rfloor \qquad \cong 9100 \text{ m}^3/\text{ton}$$

$$VWC[semen] = \left\lfloor \frac{(9636+10) \times 0.0037]}{0.0001} \right\rfloor \qquad \cong 378800 \text{ m}^3/\text{ton}$$

$$VWC[skin] = \left\lfloor \frac{(9636+10) \times 0.063]}{0.06} \right\rfloor \qquad \cong 10100 \text{m}^3/\text{ton}$$

The carcass may be further processed into secondary products, such as 'carcass frozen', 'bovine cuts, bone in', and 'meat cured'. As these products are mutually exclusive we have only one product at a time, hence their value fraction is 1 (Table 2.2).

Table 2.2. Processing water requirement, value fraction and product fraction of secondary products from bovine carcass.

	Carcass frozen	Bovine cuts, bone in	Meat cured
Quantity per ton of carcass, pf	1.00	1.00	0.98
Value fraction, vf	1	1	1
Processing water requirement, PWR (m^3/ton)	0	0	5

The virtual water contents of these secondary products are calculated as:

$$VWC[\text{carcass frozen}] \quad = \left\lfloor \frac{(16100+0)\times 1]}{1} \right\rfloor \quad \cong 16100 \text{ m}^3/\text{ton}$$

$$VWC[\text{bovine cuts}] \quad = \left\lfloor \frac{(16100+0)\times 1]}{1} \right\rfloor \quad \cong 16100 \text{ m}^3/\text{ton}$$

$$VWC[\text{meat cured}] \quad = \left\lfloor \frac{(16100+5)\times 1]}{0.98} \right\rfloor \quad \cong 16400 \text{ m}^3/\text{ton}$$

The virtual water content of secondary products from the primary products offal and raw skin can be calculated in a similar manner. If these primary products are further processed before being traded, the processing water requirement should be added. For example, 1 ton of raw skin produces only 0.40 ton of bovine leather treated and this requires 30 m^3 of water. Thus the virtual water content of the treated skin is calculated as,

$$VWC[\text{leather}] \quad = \left\lfloor \frac{\{(10100+30)\times 1\}}{0.40} \right\rfloor \quad \cong 25300 \text{ m}^3/\text{ton}$$

The above illustration is schematically presented in Figure 2.1.
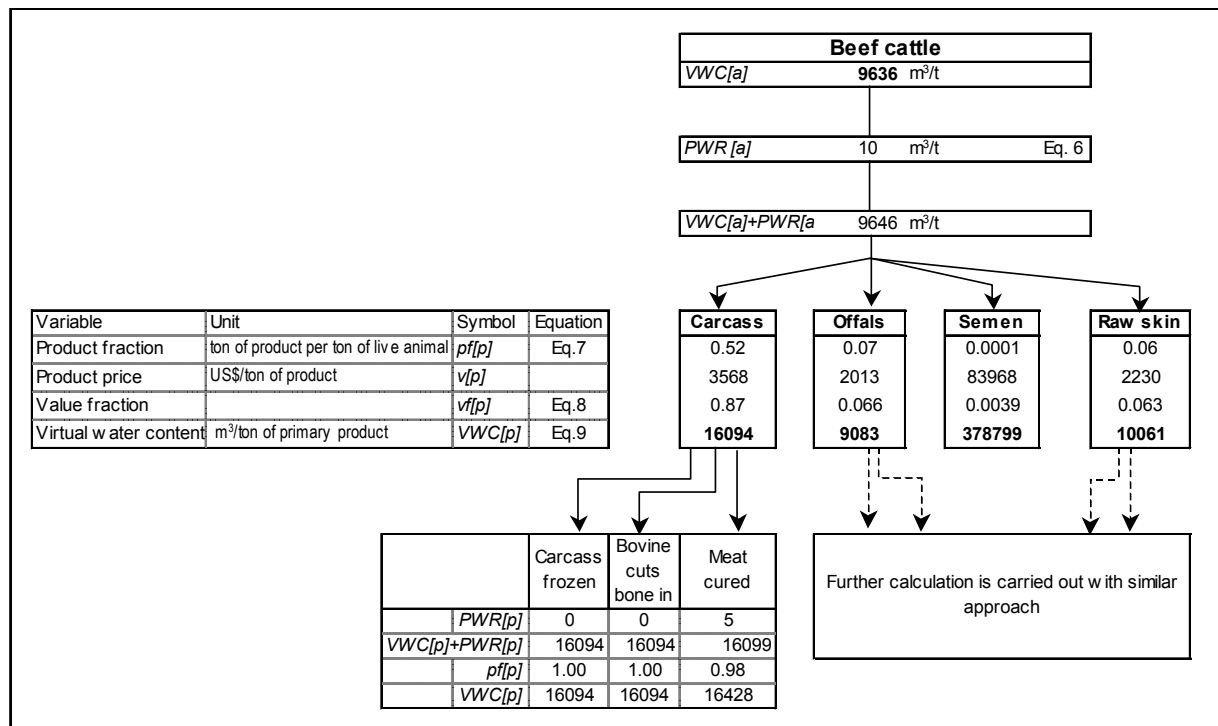
Figure 2.1. Schematic diagram of the calculation of virtual water content of products from beef cattle.

2.4. Calculation of virtual water flows between nations

For each country, the volumes of incoming and outgoing virtual water flows can be calculated by multiplying the product volumes traded with their respective virtual water content. In this study we focus on virtual water flows in relation to trade in livestock and livestock products. The various steps involved in the calculation of global virtual water flows are given in Figure 2.2.
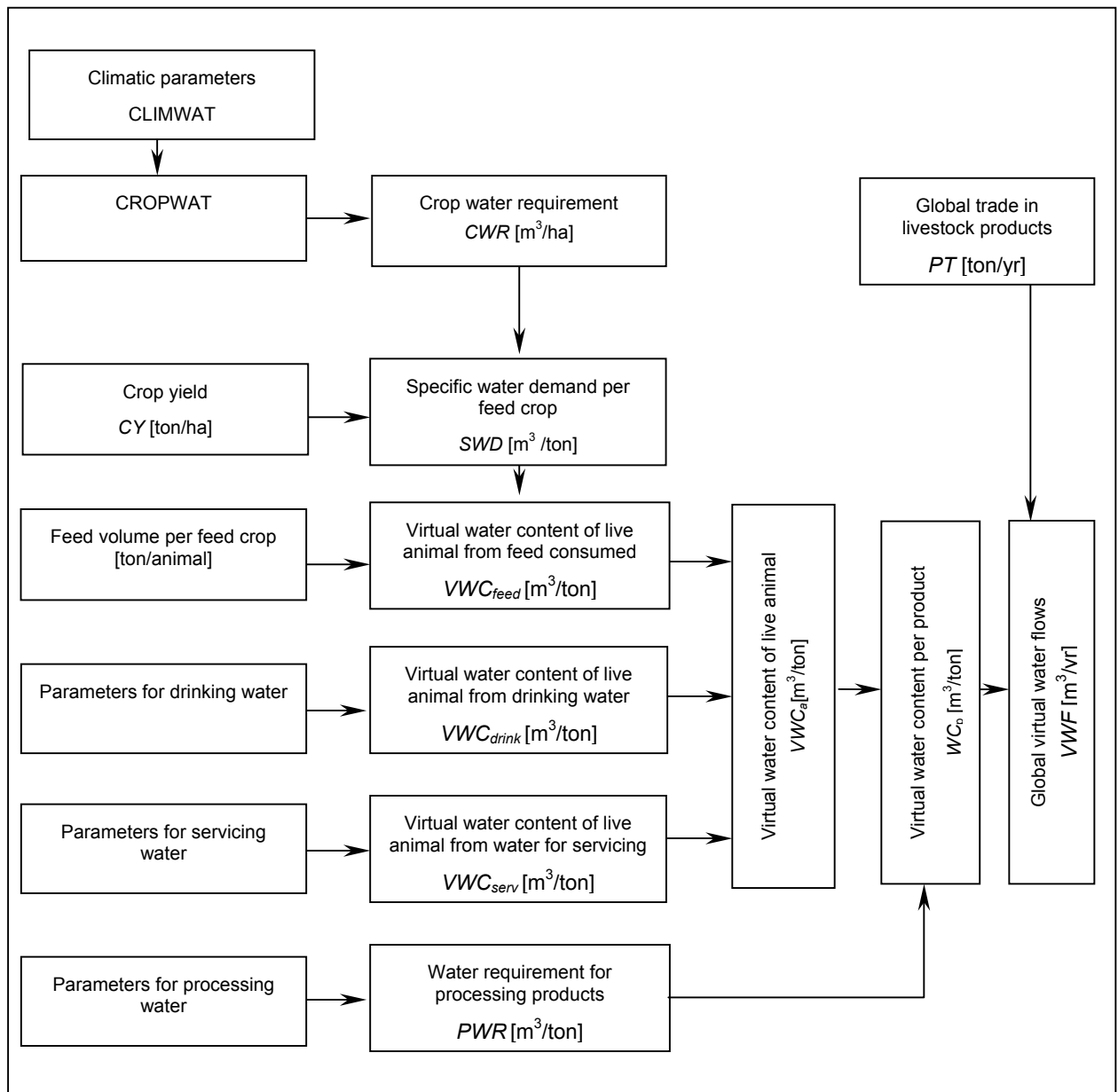
Figure 2.2. Steps in the calculation of global virtual water flows related to international trade in livestock and livestock products.

The virtual water flow VWF (m^3/yr) from exporting country e to importing country i in year t as a result of trade in livestock product p (ton/yr) can be represented as:

$$VWF[e,i,p,t] = PT[e,i,p,t] \times VWC_p[e,p] \tag{10}$$

Here, PT represents the livestock product trade (ton/yr) from exporting country e to importing country i in year t, while VWC_p is the virtual water content (m^3/ton) of livestock product p in the exporting country. The difference between total virtual water import and total virtual water export is the net virtual water balance of the country in the time period concerned. If the balance is positive it implies net virtual water being imported and if it is negative there is net export of virtual water.

2.5. Calculation of a nation's water footprint, water self-sufficiency and water dependency

The total water use within a country itself is not the correct measure of a nation's actual appropriation of the global water resources. In the case of net import of virtual water into a country, this virtual water volume should be added to the total water use within the country in order to get a picture of a nation's real call on the global resources. Similarly, in the case of net export of virtual water from a country, this should be subtracted from the volume of internal water use. The sum of volumes of water use in a country and net virtual water import can be seen as the 'water footprint' of a country. This concept is analogous to the 'ecological footprint' of a nation, a concept that refers to the amount of *land* needed for the production of the goods and services consumed by the inhabitants of a country. Studies have shown that for some countries the ecological footprint is smaller than the nation's total territory, while in other cases it is much bigger (Wackernagel and Rees, 1996; Wackernagel *et al.*, 1997). The latter means that some nations apparently need land outside their own territory to be able to provide all their goods and services.

The 'water footprint' of a country (expressed as volume of water per year) is defined as:

Water footprint = WU + NVWI (11)

where WU denotes the total water use in a country (m^3/yr) and $NVWI$ the net virtual water import of a country (m^3/yr). As noted earlier, the latter could have a minus sign.

One would logically assume that a country with great water scarcity would seek to take advantage of net virtual water import. On the other hand, countries with abundant water resources could profit by exporting water in virtual form. To understand this more clearly we can use indices such as water scarcity, water dependency and water self-sufficiency.

As an index of national water scarcity we use the ratio of total water use to water availability:

$$WS = \frac{WU}{WA} \times 100 \qquad (12)$$

In this equation, *WS* denotes national water scarcity (%), *WU* the total water use in the country (m³/yr) and *WA* the national water availability (m³/yr). Defined in this way, water scarcity will generally range between zero and a hundred per cent, but can in exceptional cases (e.g. groundwater mining) be above a hundred per cent. As a measure of the national water availability *WA* we take the average fresh water resources renewably available over a year (from precipitation falling within a country's borders and rivers flowing into the country). As noted in the previous section, total water use *WU* should ideally refer to the total of blue and green water use.

Next, we have to look for a proper indicator of 'virtual water import dependency' or 'water dependency' for short. The indicator should reflect the level to which a nation relies on foreign water resources (through import of water in virtual form). The water dependency *WD* of a nation is calculated as the ratio of the net virtual water import into a country to the total national water appropriation:

$$WD = \begin{cases} \dfrac{NVWI}{WU + NVWI} \times 100 & \text{if } NVWI \geq 0 \\[2ex] 0 & \text{if } NVWI < 0 \end{cases} \qquad (13)$$

The value of the water dependency index will per definition vary between zero and a hundred per cent. A value of zero means that gross virtual water import and export are in balance or that there is net virtual water export. If at the other extreme the water dependency of a nation approaches a hundred percent, the nation is almost completely reliant on virtual water import.

As the counterpart of the water dependency index, the water self-sufficiency index is defined as follows:

$$WSS = \begin{cases} \dfrac{WU}{WU + NVWI} \times 100 & \text{if } NVWI \geq 0 \\[2ex] 100 & \text{if } NVWI < 0 \end{cases} \qquad (14)$$

The water self-sufficiency of a nation relates to its water dependency in the following simple way:

$$WSS = 100 - WD \qquad (15)$$

Self-sufficiency is a hundred per cent if all water needed is available and indeed taken from within the national territory. Water self-sufficiency approaches zero if a country relies heavily on virtual water imports.

3. Data sources

3.1. Global trade in livestock products

Data on global trade in livestock products are taken from the database produced by the United Nations Statistics Division (UNSD, 2001) in New York in collaboration with the International Trade Centre (ITC) in Geneva. These data are based on the Commodity Trade Statistics Data Base (COMTRADE) of the UNSD. Individual countries supply the UNSD with their annual international trade statistics, detailed by commodity and partner country. These data are processed into a standard format with consistent coding and valuation. The products are classified under the Harmonised System of Classification (HS). The data are available in the form of the CD-ROM 'PC-TAS' (Personal Computer Trade Analysis System). The database covers the period 1995 to 1999.

In PC-TAS each trade flow is expressed in both physical volume (e.g. ton/yr, number/yr, m^2/yr) and trade value (US\$/yr). For some products the use of the unit to express physical trade volume for different countries is inconsistent, e.g. trade in skin is sometimes expressed in ton/yr and in other places in the database in m^2/yr. Also, sometimes only trade value is given, not physical trade volume.

Where different units of physical trade volume are used, the data have been homogenised by converting the deviant unit into the more commonly used one. If data on physical trade volume are lacking, these have been estimated on the basis of the ratio of global physical trade volume to the global trade value of the product.

The PC-TAS database covers the international trade in livestock and its products under different product groups, as listed in Table 3.1.

Table 3.1. Relevant product groups in PC-TAS.

Group code	Product group
AA	Live animals
AB	Meat and edible offal, fresh, chilled, frozen
AC	Meat products
AG	Dairy products and eggs
AY	Products of animal origin, edible, not else specified
AZ	Products of animal origin, not edible, not else specified
HA	Hides and skins
HB	Leather and its products
HZ	Leather products, not else specified

The various products, their groups and their product codes as used in PC-TAS are listed in Appendix II. Appendix III presents per product the global trade volume in ton/yr and the global trade value in US\$/yr. It also

shows per product its contribution to the total global trade value. The shares of different product groups of the total global trade value are shown in Figure 3.1.
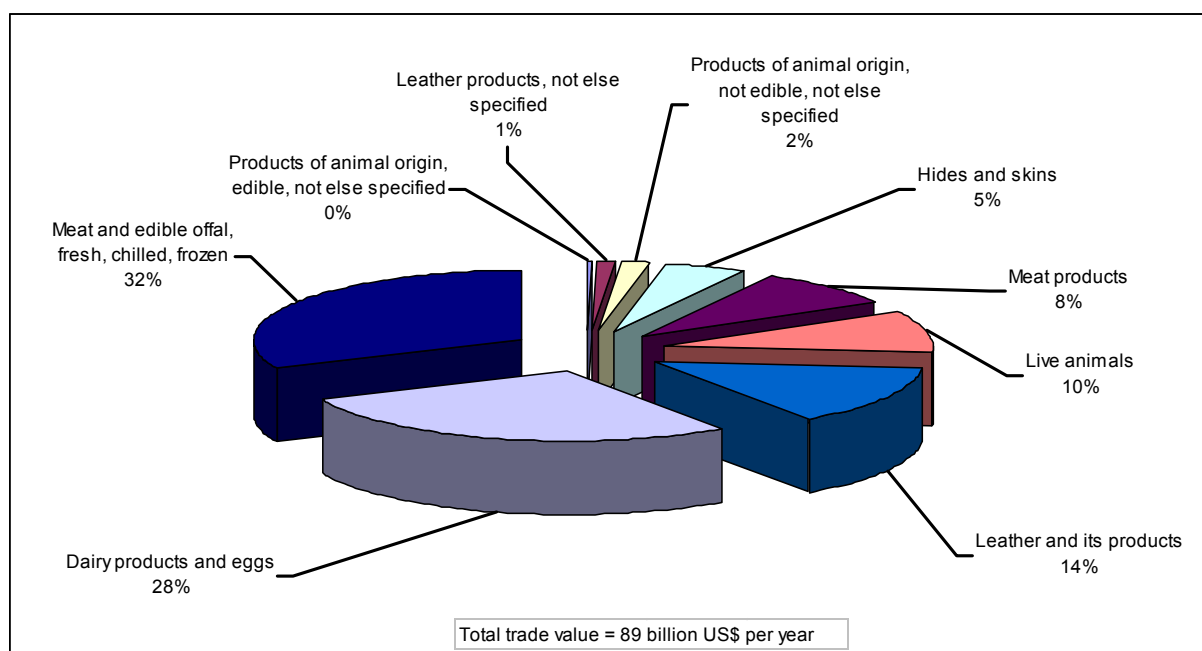
Figure 3.1. Total value of global trade in livestock and livestock products per product category (1995-99).

In this study the products categorised in PC-TAS have been re-grouped, based on the animals from which they come (Appendix IV). The various animal groups and their share of total global trade value are tabulated in Table 3.2 and shown in Figure 3.2. In a next step, the products in each animal group have been arranged in a product tree (Appendix V).

Table 3.2. The trade values of animal groups and their share in the total global trade (1995-99).

Animal group	Average trade value (billion US$/yr)	Contribution to the total trade value (%)
Beef cattle	33.5	37.7
Dairy cows	23.6	26.6
Swine	15.1	17.0
Sheep	4.8	5.4
Goats	0.44	0.5
Poultry and Fowls	2.1	2.4
Laying hens	1.4	1.5
Horses	1.5	1.7
Others	6.3	7.1
Total	88.8	100.0
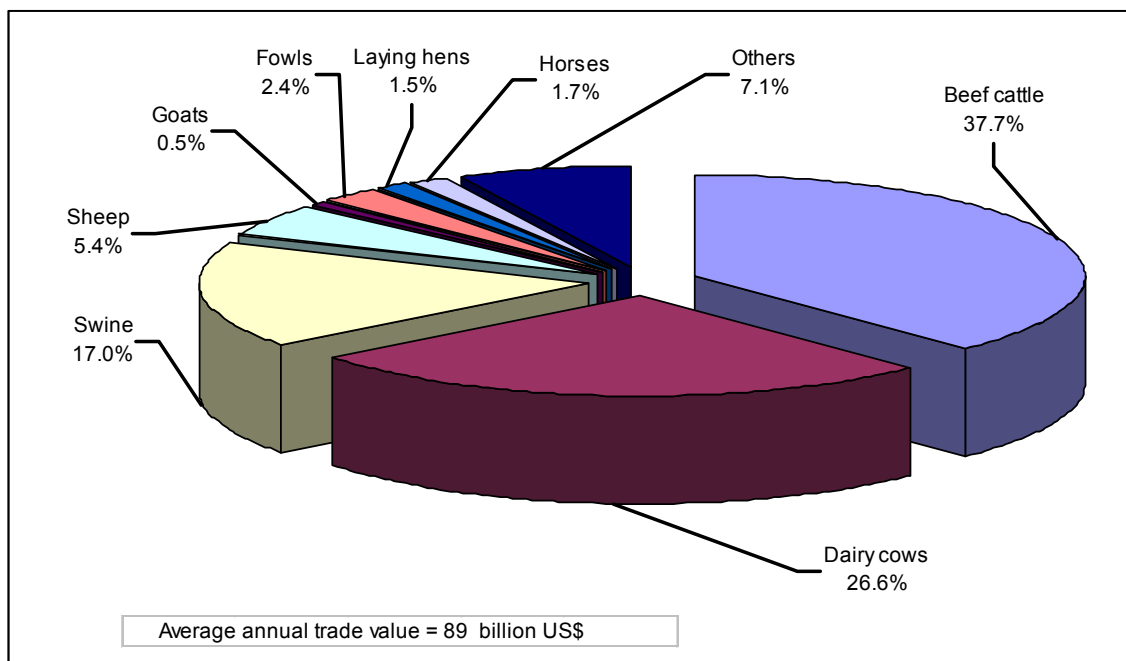
Figure 3.2. Total value of global trade in livestock products per animal category (1995 to 1999).

3.2. Farming systems

Animal production parameters such as feed composition, drinking and service water volumes, product yields and so on depend on the type of farming system. For that reason, we need to distinguish a limited number of farming systems to be used in this study.

FAO (1995) distinguishes between three major types of farming systems: grazing systems, mixed systems and industrial systems. The grazing systems have low stocking rates, generally fewer than 10 livestock units per hectare of agriculture land. In the mixed systems livestock farming is combined with crop farming, where (part of) the crop (by-) products are used as feed for the animals. In the industrial systems there are average stocking rates of more than 10 livestock units per hectare of agricultural land and less than 10 per cent of the dry matter fed to livestock is produced on the farm (FAO, 2000).

In terms of total production, grazing systems supply only 9 per cent of global meat production (FAO, 1995). Globally, mixed farming systems have the largest share of total meat (54 per cent) and milk (90 per cent) production and mixed farming is the main system for smallholder farmers in many developing countries (FAO, 1995). Industrial systems supply more than 50 per cent of the global pork and poultry meat and 10 per cent of beef and mutton (FAO, 1995).

Although the definitions imply distinct systems, current pressures on livestock production result in a blurring of the boundaries between one system and another, e.g. mixed systems which use external feed may become indistinguishable from industrial systems. The average values of various animal production parameters for relevant kinds of animal are given in Table 3.3. The table shows values for the industrial and grazing systems

only. Values for the mixed system are assumed to be average of the values for the industrial and grazing systems. The definitions for the terminology pertinent to livestock and its products, such as dressed weight, carcass, offal, live weight etc., are adapted from the FAO (2002c).

Table 3.3. Animal production parameters for industrial and grazing systems.

Animal	Parameter	Industrial system	Grazing system
Beef cattle	Cows at slaughter (age in month)	36	36
	Live weight of animal at slaughter (ton)	0.55	0.40
Dairy cattle	Calves (age in yr.)	0-1	0-1
	Heifers (age in yr.)	1-3	1-3
	Milking cows (age in yr.)	3-10	3-10
	Milk production during lactation (kg/yr)	7400	2500
	Number of lactations	7	7
	Live weight of animal at slaughter (ton)	0.45	0.27
Swine	Adult (age in months)	10	12
	Live weight of animal at slaughter (ton)	0.118	0.090
Sheep	Adult (age in months)	18	24
	Live weight of animal at slaughter (ton)	0.053	0.04
Goats	Adult (age in months)	24	30
	Live weight of animal at slaughter (ton)	0.040	0.035
Broiler chickens	Slaughter age (weeks)	10	15
	Live weight (kg)	2.20	1.80
Laying hens	Start of laying eggs (week)	22	25
	Slaughter age (week)	75	75
	Egg production (number/yr)	300	120
	Live weight (kg)	2.00	1.50
	Weight of eggs (gram)	50	35
Horses	Foal (age in month)	1	1
	Mature horses (age in month)	24	24
	Live weight of animal at slaughter (ton)	0.40	0.40

Sources: WUR (2002), FAO (2002a), USDA (1998; 2002c).

In this study we presuppose a crude relationship between gross national income (GNI) per capita and the three different farming systems. For countries with high GNI per capita the industrial farming system is assumed to be dominant, for countries with low GNI per capita the grazing system is dominant, and for the countries with average GNI per capita, the mixed farming system is assumed to be dominant (Table 3.4). The data on GNI per capita are taken from World Bank (2002). Country groups based on average gross national income per capita (1997-2000) are listed in Appendix VII.

Table 3.4. Assumed dominant farming system based on average gross national income per capita.

Gross national income per capita (US$/yr/capita)	Dominant farming system (assumed)
< 1200	Grazing system
>1200 and <17000	Mixed system
> 17000	Industrial system

3.3. Feed composition by kind of animal

The feed data for the different livestock farming systems are generally available in terms of nutrient value. The composition of the feed, the diet of the animal, can differ, although the nutritional value is the same. The web publication of the 'Canada Statistics Division' (Statistics Canada, 2002) is used as the feed data source for the industrial livestock system. Feed data for mixed and grazing production systems are available for only a few kinds of animal in the form of some specific case studies.

The daily feed requirement of an animal depends upon a number of variables, such as breed, weight, farming system, ambient temperature, etc. We can assume that the weight is dependent upon the breed. The World Watch List for Domestic Animal Diversity (FAO, 2002a) lists 6,379 breeds. It is not within the scope of the present study to analyse each individual breed per country. Here it is assumed that breeds with high production are used in the industrial farming system and local and indigenous breeds in the grazing system. The mixed system is assumed to have an equal mix of both categories. The major variable in this case is the farming system.

The feed data are available as an average value of feed for different age groups per animal. It is assumed that a linear relationship exists between the feed volumes and the age until adulthood, as shown in Figure 3.3.
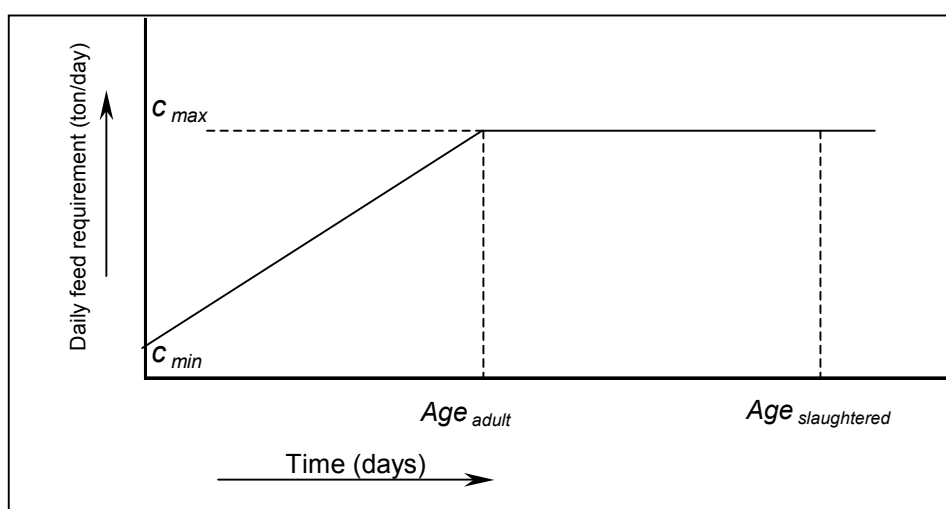
Figure 3.3. Feed requirement curves for different age groups of an animal.

The daily feed consumption is calculated as:

For Age <Age$_{adult}$:

$$C[e,a,c] = \left(\frac{C_{max}[e,a,c] - C_{min}[e,a,c]}{Age_{adult}[e,a]} \right) \times Age + C_{min}[e,a,c] \tag{16}$$

For Age >Age$_{adult}$:

$$C[e,a,c] = C_{max}[e,a,c] \tag{17}$$

where $C[e,a,c]$ is quantity of crop c in the daily feed composition of animal a in exporting country e. $C_{max}[a,e,c]$ and $C_{min}[e,a,c]$ are the quantity of crop c in the feed composition of an adult and a baby animal respectively.

The feed data for industrial livestock systems is taken from the study of Canadian feed requirements conducted by Statistics Canada (Table 3.5).

Table 3.5. Feed composition for different animals in industrial systems (data in ton/yr).

Animal	Wheat	Oats	Barley	Other small grains	Grain corn	Dry peas	Soya bean meal	Canola meal	Mill screen	Non grain portion	Pasture	Dry hay	Silage	Other rough-ages
Beef cattle	0.015	0.16	0.35	0.0090	0.087	0.0090	0.023	0.014	0.044	0.017	1.52	1.02	0.64	0.26
Beef heifers<1 yr	0.0040	0.090	0.043	0.0030	0.016	0.0040	0.0020	0.0080	0.011	0.0030	0.53	0.53	0.13	0.097
Calves< 1yr	0.023	0.063	0.15	0.027	0.26		0.076	0.019	0.032	0.025	0.061	1.05	0.43	0.06
Heifers	0.056	0.028	0.48	0.039	0.87	0.0020	0.17	0.059	0.13	0.096	0.32	1.14	2.01	0.021
Dairy cows	0.090	0.020	0.77	0.053	1.42	0.0030	0.26	0.10	0.22	0.16	0.33	1.03	2.97	
Pigs	0.069	0.039	0.39	0.0040	0.22	0.018	0.053	0.048	0.014	0.040		0.079		
Weaner pigs	0.0010		0.0030		0.013		0.0050			0.0040				
Sheep	0.0020	0.0050	0.032	0.0010	0.0040	0.0010	0.0020	0.0010	0.0020	0.0010	0.27	0.36	0.070	0.0060
Goats		0.0040	0.013	0.0010	0.0060		0.0020	0.0010		0.0010	0.10	0.061	0.0010	
Poultry	0.011				0.010		0.0034	0.0020	0.0017	0.0065				
Laying hens	0.011				0.010		0.0034	0.0020	0.0017	0.0065				
Horses	0.0010	0.20	0.078	0.012	0.025	0.0020	0.026	0.0030	0.0020	0.020	1.51	1.76	0.049	0.062

Source: Statistics Canada (2002).

The data on feed composition for different animal groups in grazing livestock systems are not available from one single source. Data on daily feed crop and its quantity have to be collected from different sources for different animals and their major breeds. The averages are taken from the most often quoted ranges in the data for major breeds and tabulated in Table 3.6.

Table 3.6. Feed composition for different animals in grazing systems (data in ton/yr).

Animal	Wheat	Oats	Barley	Other small grains	Grain corn	Dry peas	Soya bean meal	Canola meal	Mill screen	Non grain portion	Pasture	Dry hay	Silage	Other roughages
Beef cattle	0.0060	0.066	0.14	0.0036	0.035	0.0036	0.0092	0.0056	0.018	0.0068	1.82	1.23	0.77	0.31
Beef heifers<1 yr	0.0016	0.036	0.017	0.0012	0.0064	0.0016	0.0008	0.0032	0.0044	0.0012	0.63	0.64	0.15	0.12
Calves< 1yr	0.0046	0.013	0.031	0.0054	0.052		0.015	0.0038	0.0064	0.0050	0.092	1.57	0.65	0.090
Heifers	0.011	0.0056	0.096	0.0078	0.17	0.00040	0.034	0.012	0.025	0.019	0.48	1.71	3.02	0.032
Dairy cows	0.018	0.0040	0.15	0.011	0.28	0.00060	0.052	0.020	0.044	0.032	0.49	1.54	4.46	
Pigs			0.047	0.14			0.024			0.30				0.079
Sheep	0.00050	0.0025	0.013	0.00050	0.0025	0.00050	0.0010	0.00050	0.00050	0.00050	0.18	0.20	0.032	0.0030
Goats		0.0020	0.0065	0.00050	0.0030		0.0010	0.00050		0.00050	0.16	0.092	0.0015	
Poultry	0.011				0.010		0.0034	0.0020	0.0017	0.0065				
Laying hens	0.011				0.010		0.0034	0.0020	0.0017	0.0065				
Horses	0.00040	0.078	0.031	0.0048	0.010	0.00080	0.010		0.0012	0.00080	0.0080	1.81	2.11	0.059	0.074

Sources: USDA (1998, 2002a, 2002b, 2002d), FAO (1987, 2002b), Haan (1998), Blackburn (1998), Anderson (2002), Boleman et al.(2001), Pirelli et al.(2000), Paris(2002).

The specific water demands (*SWD*) for different crops can be calculated for major crops using CROPWAT of the FAO. The climate data set required for the CROPWAT model is obtained from the FAO's CLIMWAT database. But CLIMWAT does not cover the climate data for the entire world (for example, it does not cover the North American countries). For countries where required climatic input data are not available in CLIMWAT, crop water requirements have been taken equal to the guideline of FAO as reported by Gleick (1993). If there are a number of climate stations within a country, the data are taken from the station in its capital. This assumption generalises data over a wide range and the climate station in the capital may not reflect the area where the main part of the crops are grown. CROPWAT uses different crop-coefficients K_c for different crops. In this model, the growing season and the starting date of crop plantation are to be selected by the user.

For the present study, the specific water demands per crop type per country are taken from Hoekstra and Hung (2002), a study that covers a wide range of crops grown and traded worldwide. The global average specific water demands of feed crops are presented in Table 3.7.

Table 3.7. Global average specific water demand of some feed crops[1] (m^3/ton).

Barley	Bean dry	Maize	Millet	Oats	Potato	Sorghum	Soybean	Sweet potato	Vegetables	Wheat
1057	3171	463	3032	1960	161	924	1716	468	431	1109

[1] *Based on country data in Hoekstra and Hung (2002). Country data have been weighted based on their share in global virtual water export per crop type.*

Some of the feed crops, such as 'forage' and 'pasture' are not covered in the study and it is therefore necessary to calculate the specific water demand for these feeds using the method described in Section 2.2.2. The average specific water demand for pasture in a tropical climate is estimated as 445 m^3/ton and this is provisionally

assumed to represent the global average. The volume of water required to prepare the feed mix is assumed to be 50 per cent of the total volume of grain in feed for all kinds of animal.

3.4. Drinking water requirement

The drinking water requirement q_d depends on variables such as breed, age, weight, farming system, ambient temperature, etc. For each kind of animal the data for the daily drinking water requirement during the animal's entire life span have to be collected as a function of the farming system and the temperature zone. Demand curves of such a nature for different breeds in different temperatures and farming systems are not available.

It is assumed here that the demand increases linearly with age and becomes constant after the animal reaches adulthood (Figure 3.4). Equations 18 and 19 give the daily drinking water requirement of an animal.
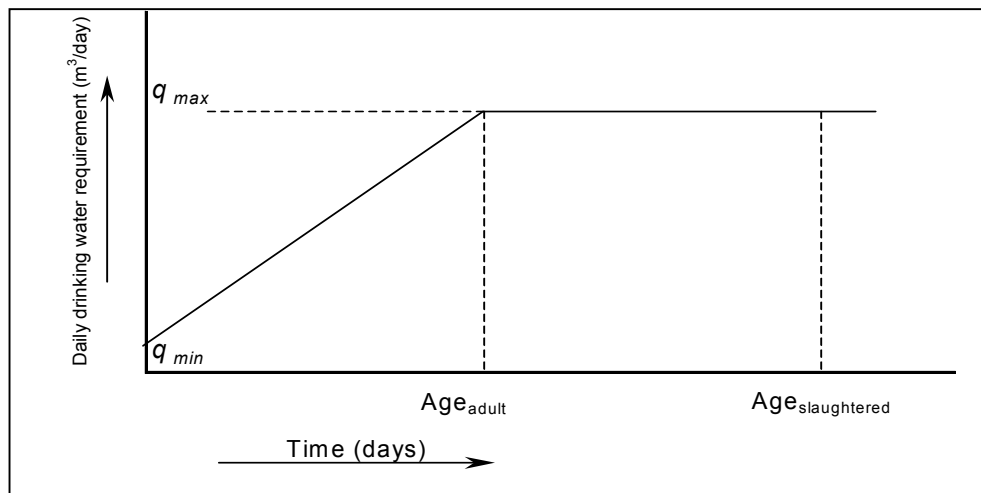
Figure 3.4. Simplified drinking water function.

For Age <Age$_{adult}$:

$$q_d[e,a] = \left(\frac{q_{max}[e,a] - q_{min}[e,a]}{Age_{adult}} \right) \times Age + q_{min}[e,a]$$

(18)

For Age >Age$_{adult}$:

$$q_d[e,a] = q_{max}[e,a]$$

(19)

Here $q_d[e,a]$ is the daily drinking water requirement of animal a in exporting country e. $q_{max}[e,a]$ and $q_{min}[e,a]$ are the average daily drinking water requirements of an adult and a baby animal respectively. Age$_{adult}$ is the age of an animal in days when adult.

The daily drinking water requirements for different breeds of different animals are available in various sources. There is a wide variation in the data in these sources, maybe due to differences in the environment and other variables, which are not clearly stated in most of the reports. The data sets presented are not always complete and sometimes no data are available for different temperature zones, age groups or different farming systems.

The data on daily drinking water for different animals and their main breeds are collected from these sources and average values are calculated from the most often quoted ranges for the main breeds (Table 3.7). For the mixed farming system we have taken the average of the other two systems.

Table 3.8. Drinking water requirement for different animals in different farming systems (litre/animal /day)[1].

Animal	Age group	Drinking water requirement	
		Industrial system	Grazing system
Beef cattle	Young calves	5	5
	Adult cows	38	22
Dairy cattle[2]	Calves, 0-1 yr	5-23	4-18
	Heifers, 1-3 yr	26-70	18-30
	Milking cows, 3-10 yr	70	40
Swine	Piglet	1.8	1.8
	Adult	14	8
Sheep	5lbs lamb	0.38	0.30
	Adult	7.6	6.0
Goats	5lbs kid	0.38	0.30
	Adult	3.8	3.5
Broiler chicken	Chick	0.02	0.02
	Adult	0.18	0.18
Laying hens	Chick	0.02	0.02
	Laying eggs	0.30	0.30
Horses	Foal	3	3
	Mature horse	45	45

[1] *Sources: Pallas (1986), Irwin (1992), Alberta (1996, 2000), AAFC (2000), Gregorica (2000), Jermar (1987), Kammerer (1982), Kollar and MacAuley (1980), US-AEP (2002), World Bank (1996), NCDENR (2002), NDSU (1992), UMCE (2002) and Looper and Waldner (2000).*

[2] *The demands for drinking and service water are different in the dry periods between two lactation periods, but in this study we have taken the demands as constant for adult cows.*

3.5. Service water requirement

There is very little literature on the water requirement for the servicing. Some sources simply cover this under drinking water requirements, and there are not enough data on all the countries and different animals. We have primarily used data from Alberta (1996) and Jermar (1987). Average values have been taken wherever possible and if there were no data at all a simple reasonable guess has been made. The results are presented in Table 3.8.

Table 3.9. Service water requirement for different animals in different farming systems (litre/animal/day).

Animal	Age group	Service water requirement	
		Industrial system	Grazing system
Beef cattle	Young calves	2	0
	Adult cows	11	5
Dairy cattle	Calves, 0-1 yr	0	0
	Heifers, 1-3 yr	11	4
	Milking cows, 3-10 yr	22	5
Swine	Piglet	5	0
	Adult	50	25
Sheep	5lbs lamb	2	0
	Adult	5	5
Goats	5lbs kid	0	0
	Adult	5	5
Broiler chicken	Chick	0.01	0.01
	Adult	0.09	0.09
Laying hen	Chick	0.01	0.01
	Laying eggs	0.15	0.15
Horses	Foal	0	5
	Mature horses	5	5

Sources: Alberta (1996), Jermar (1987).

3.6. Processing water requirement

For any specific product the processing water requirement is more or less the same across different countries. There are minor variations, based on the efficiency of water use depending on recycling percentage, cooling processes, etc. As the processing water is only a small part of the virtual water content of a livestock product, it will not affect the end results of the study if we assume one constant value for a specific product across the globe. The data are collected from various sources (Kollar and MacAuley, 1980; Kammerer, 1982; Twort *et al.* 2000; Van der Leeden *et al*., 1990; NCDENR, 2002; World Bank, 1996) and are listed in Appendix VI.

3.7. Product fractions and value fractions of livestock products

The product fraction for a primary product is largely dependent upon the breed of an animal. The product fractions of secondary and tertiary products are less dependent upon the breed of the animal. The animal production parameters (live weight, milk production, egg production and dressed weight etc.) for different kinds of animals are presented in Table 3.3. We have assumed a constant set of product fractions *pf* and value fractions *vf* for secondary and tertiary products across the globe (Appendix VI).

The product fractions for various livestock products are determined by using commodity trees as defined in FAO (2003c) and production data from other sources. Based on average world market price (Appendix VIII) the value fraction *vf* for each product is calculated using Equation 8 and the results are presented in Appendix VI. The virtual water content of a product is directly proportional to its *vf* and inversely proportional to its *pf*.

4. Virtual water content per livestock product per country

4.1. Virtual water content of a live animal by kind of animal and by country

The full calculation of the virtual water content of a live animal for each animal category is shown for the example of Canada in Appendix IX. The virtual water contents of live animals have been calculated for all countries of the world and are presented in Appendix X.

Farming system and climate are the most important factors determining the virtual water content of a live animal. Table 4.1 shows that the animals grown in industrial farming systems are generally more water efficient than others. Animals grown in the grazing system have generally high virtual water content, because these animals have generally longer life span and less production. The mixed system is often in between the other two systems, but not in all cases. This is due to the fact that the presented figures for these systems not only reflect the physical characteristic of the systems, but also the dominant climate where the systems are located.

Table 4.1. Global average virtual water content of different live animals for each of the three farming systems in m^3/ton at slaughter age.

	Virtual water content of a live animal (m^3/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Poultry/ Fowls	Laying hens	Horses
Grazing system[*]	13824	159523	2709	6435	6692	7702	38519	5600
Mixed system[*]	11857	121099	4344	5817	5499	2695	15422	5396
Industrial system[*]	8999	85955	2415	6074	2896	1028	7241	5524
World average	9678	94642	2819	6049	5234	1498	9529	5455

[*] *The data are weighted based on the total volume of water traded per live animal per farming system.*

The virtual water content of different live animals for a few selected countries which are most relevant in the context of international trade in livestock (products) are presented in Tables 4.2 (m^3/animal) and 4.3 (m^3/ton). Although the virtual water content of a dairy cow is very high if compared to a beef cow, it has higher water productivity (in terms of dollar production per unit of water) than a beef cow. This is because a dairy cow produces milk during its productive life span and finally meat after slaughter. Similarly a laying hen produces eggs while it grows and meat at the end of its productive life span. The virtual water content (per ton) of beef cattle is roughly 6 to 7 times higher than a broiler chicken (poultry). It implies that a diet with white meat from a broiler chicken is more water efficient than a diet with red meat from a beef cow. Swine is second most water efficient in terms of water use per ton of meat production (Table 4.3).

It should be noted that the virtual water content of live animals refers to the virtual water content of the animals at the end of their average lifetime under current production conditions. This is of course shorter than the natural lifetime. It should further be noted that if one were to consider the virtual water content of the average animal being traded, the figures presented here are overestimates, because not all traded animals are 'mature'.

Table 4.2. Virtual water content of different live animals at slaughter age for selected countries in m³/animal.

	Virtual water content of a live animal (m³/animal)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Australia	6393	58250	723	337	134	5	33	2500
USA	5484	39443	398	303	114	3	18	2350
New Zealand	4985	54391	391	263	152	8	45	2178
Canada[1]	5252	39359	387	301	111	3	19	2227
Argentina	5457	42197	361	276	152	5	25	2313
Ireland	4134	34118	238	278	98	2	13	1866
Brazil	4553	31383	341	264	104	3	18	2227
Uruguay	6466	44645	445	293	165	6	31	2810
Denmark	4266	34041	263	283	99	2	12	1877
France	4220	32350	228	279	97	2	11	1876
Netherlands	4183	34588	246	279	98	2	13	1863

[1] *The precise calculation for Canada (with dominantly the industrial farming system) can be found in Appendix IXb.*

Table 4.3. Virtual water content of different live animals for selected countries in m³/ton.

	Virtual water content of a live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Australia	11730	128305	6126	6353	3351	2373	16714	6251
USA	10063	86879	3374	5718	2843	1304	9183	5874
New Zealand	10551	150251	3764	5649	4045	4179	23907	5445
Canada[1]	9636	86693	3276	5674	2775	1358	9563	5567
Argentina	11549	116565	3471	5943	4052	2327	13315	5782
Ireland	7586	75150	2017	5251	2455	908	6395	4664
Brazil	9636	86693	3276	5674	2775	1358	9563	5567
Uruguay	13684	123330	4277	6294	4410	2814	16102	7024
Denmark	7827	74980	2232	5334	2484	865	6094	4693
France	7744	71255	1936	5257	2424	795	5598	4689
Netherlands	7676	76186	2084	5259	2451	914	6440	4658
World average[2] (weighted)	9678	94642	2819	6049	5234	1498	9529	5455

[1] *The precise calculation for Canada (with dominantly the industrial farming system) can be found in Appendix IXb.*

[2] *The country data are weighted based on the total volume of water traded per animal per country.*

4.2. Virtual water content per livestock product by country

The virtual water content of bovine meat is relatively high if compared to the virtual water content of pork, goat and chicken meat. Beef requires in average 22 m³/kg (with difference of course over the various countries and specific meat categories). Pork takes in average 3.5 m³/kg, goat meat 6 m³/kg, sheep meat 9 m³/kg, horse meat 8

m³/kg and chicken meat 2.3 m³/kg. Milk has a virtual water content of about 0.8 m³/litre, while cheese has a virtual water content of 4.6 m³/kg. In average 1 kg of eggs contain 2 m³ of virtual water. The virtual water content of each livestock product per country is shown in Appendix XI. The virtual water content of some of the main livestock products from selected countries is given in Table 4.4. One should obviously be aware that the virtual water content continues to increase with each level of processing, and that the production factor *pf* (ratio of weight of a product to the weight of its resource material) has a direct effect on the virtual water content of a livestock product.

Table 4.4. Virtual water content (m³/ton) of some of the main livestock products for selected countries.

	Australia	USA	New Zealand	Canada	Argentina	Ireland	Brazil	Japan	Italy	China	World average[*]
Bovine cuts boneless, frozen	27590	23674	24820	22671	27165	17854	30888	22432	22573	29625	24838
Bovine and equine leather, tanned or retanned, not else specified	30676	26330	27602	25217	30204	19872	34335	24952	25108	32933	27319
Bovine cuts boneless, fresh or chilled	27590	23674	24820	22671	27165	17854	30888	22432	22573	29625	23685
Bovine, live except pure-bred breeding	11730	10063	10551	9636	11549	7586	13133	9535	9595	12596	9678
Bovine hides, whole, fresh or wet-salted	15318	13145	13781	12588	15082	9916	17148	12456	12534	16447	12840
Bovine leather, otherwise pre-tanned, not else specified	30676	26330	27602	25217	30204	19872	34335	24952	25108	32933	28287
Bovine cuts bone in, fresh or chilled	19587	16806	17620	16094	19285	12674	21929	15924	16025	21032	14592
Cheese not else specified	6298	4288	9851	4279	7922	3719	8930	5690	4372	10742	4801
Milk powder not exceeding 1.5% fat	5488	3732	8591	3724	6906	3235	7786	4956	3805	9369	4890
Milk and cream powder unsweetened exceeding 1.5% fat	5488	3732	8591	3724	6906	3235	7786	4956	3805	9369	5121
Bovine and equine leather, full/split grains, not else specified	30676	26330	27602	25217	30204	19872	34335	24952	25108	32933	27381
Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	16048	13770	14437	13187	15801	10384	17967	13048	13130	17232	15206
Swine cuts, frozen not else specified	9251	5103	5691	4955	5249	3057	7561	6170	5241	3819	3973
Sausage & similar products of meat, meat offal / blood & food prepared based on these products	11055	9485	9945	9083	10884	7153	12376	8987	9044	11870	8847
Bovine carcasses and half carcasses, fresh or chilled	19587	16806	17620	16094	19285	12674	21929	15924	16025	21032	14516
Bovine cuts bone in, frozen	19587	16806	17620	16094	19285	12674	21929	15924	16025	21032	15666
Bovine edible offal, frozen, not else specified	12656	10859	11385	10399	12461	8189	14169	10289	10354	13589	11076
Bovine and equine leather, not else specified	30686	26340	27612	25227	30214	19882	34345	24962	25118	32943	27832
Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	1219	829	1909	828	1535	719	1730	1101	846	2082	820
Guts, bladders and stomachs of animals except fish whole or in pieces	11055	9485	9945	9083	10884	7153	12376	8987	9044	11870	9368
Sheep, live	6353	5718	5649	5674	5943	5251	6281	5658	5716	5948	6049
Swine cuts, fresh or chilled, not else specified	9251	5103	5691	4955	5249	3057	7561	6170	5241	3819	3681

[*] *World averages for livestock products have been calculated as the ratio of total product trade volume to the global virtual water trade volume for the product concerned.*

5. International virtual water flows related to the trade in livestock and livestock products

5.1. International virtual water flows

The global volume of international virtual water flows during the period 1995-99 in relation to the trade in livestock and livestock products was 336 Gm^3/yr. The volumes are comparable in the separate years (Table 5.1).

Table 5.1. Global volume of international virtual water flows during 1995-99 (insofar related to trade in livestock and livestock products).

Year	Virtual water flows Gm^3 per year
1995	314
1996	332
1997	354
1998	341
1999	337
Average	336

Products from beef cattle have the largest share of the global flows in virtual water (69 per cent), followed by dairy cow products (11 per cent), swine products (6.5 per cent) and sheep products (4 per cent). The trade by animal category is shown in Figure 5.1.
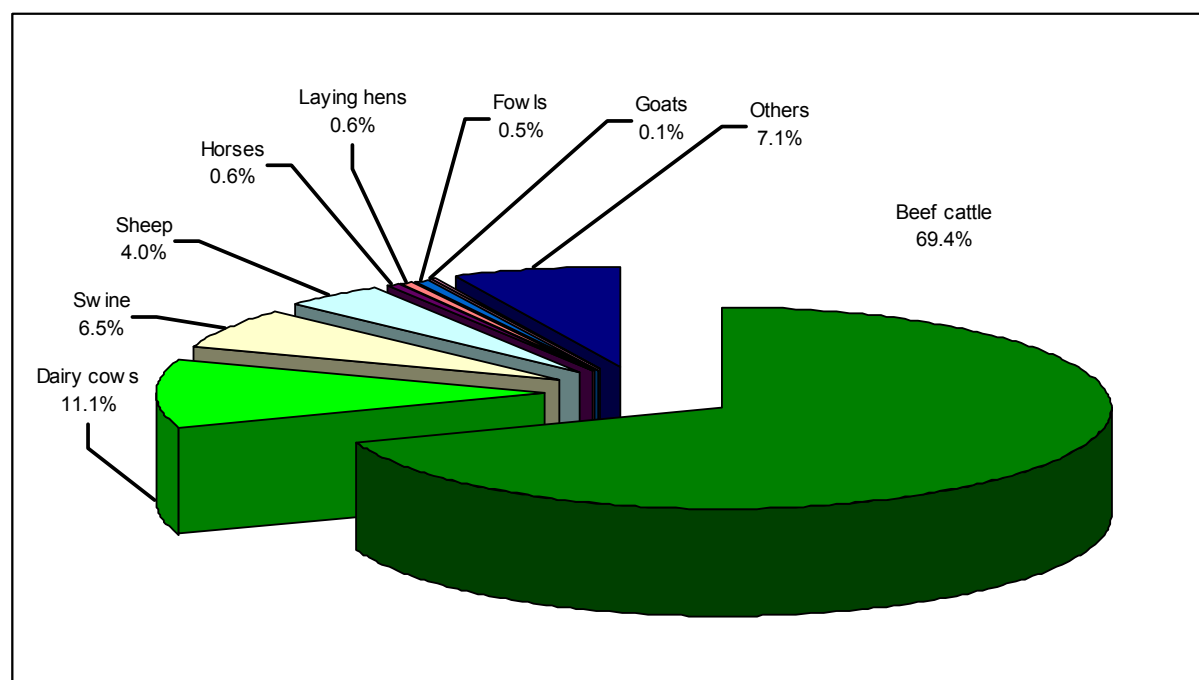
Figure 5.1. Global virtual water flows by animal category (1995-99).

The main products, which contributed more than 1 per cent to the global virtual water flows in the period 1995-99, are shown in Table 5.2. A complete list of virtual water flows by product is presented in Appendix XII.

Table 5.2. Livestock products contributing more than 1 per cent to global virtual water flows (1995-99).

Product	Gross virtual water trade (Gm^3/yr)	Contribution to the total trade (%)
Bovine cuts boneless, frozen	54.0	16.1
Bovine and equine leather, tanned or retanned, not else specified	41.3	12.3
Bovine cuts boneless, fresh or chilled	26.1	7.8
Bovine, live except pure-bred breeding	20.5	6.1
Bovine hides, whole, fresh or wet-salted	20.1	6.0
Bovine leather, otherwise pre-tanned, not else specified	14.1	4.2
Bovine cuts bone in, fresh or chilled	13.1	3.9
Cheese not else specified	9.6	2.9
Milk powder not exceeding 1.5% fat	7.5	2.2
Milk and cream powder unsweetened exceeding 1.5% fat	7.4	2.2
Bovine and equine leather, full/split grains, not else specified	6.6	2.0
Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	6.4	1.9
Swine cuts, frozen not else specified	5.6	1.7
Sausage & similar products of meat, meat offal / blood & food prepared based on these products	5.3	1.6
Bovine carcasses and half carcasses, fresh or chilled	4.8	1.4
Bovine cuts bone in, frozen	4.0	1.2
Bovine edible offal, frozen, not else specified	3.8	1.1
Bovine and equine leather, not else specified	3.8	1.1
Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	3.6	1.1
Guts, bladders and stomachs of animals except fish whole or in pieces	3.5	1.0
Sheep, live	3.3	1.0
Swine cuts, fresh or chilled, not else specified	3.3	1.0
All other products	68	20.3
Global virtual water trade	336	100.0

The export and the import of virtual water during the period 1995-99 have been calculated for each country and are shown in Appendix XIII and XIV respectively. The virtual water balance is arrived at by subtracting the export volume from the import volume for each country. The complete list of net virtual water imports is given in Appendix XV. The top twenty net exporter and net importer countries for the period 1995-99 are listed in Table 5.3.

Table 5.3. Top twenty net virtual water exporters and importers (1995-99).

Exporter countries	Net export volume (Gm^3/yr)	Rank	Importer countries	Net import volume (Gm^3/yr)
Australia	38.8	1	Japan	28.9
USA	30.6	2	Italy	24.0
New Zealand	20.4	3	Hong Kong	16.6
Canada	11.3	4	South Korea	13.4
Argentina	10.7	5	Taiwan	10.7
Ireland	8.2	6	Russian Federation	8.9
Brazil	7.2	7	United Kingdom	5.1
Uruguay	6.4	8	Indonesia	4.9
Denmark	5.8	9	Mexico	4.3
France	4.9	10	Philippines	3.8
Netherlands	4.0	11	Portugal	3.5
India	3.8	12	Egypt	2.9
Belgium-Luxembourg	3.7	13	Greece	2.6
Poland	2.4	14	United Arab Emirates	2.5
Sri Lanka	2.0	15	Malaysia	2.3
Austria	1.5	16	Saudi Arabia	2.3
Lithuania	1.1	17	Chile	2.2
Hungary	1.0	18	Singapore	2.1
Germany	0.9	19	Turkey	1.5
Nicaragua	0.9	20	Israel	1.5

The table shows the ranking in *net* import or export. If we look at *gross* export of virtual water, the top seven exporting countries are: USA (67.6 Gm^3/yr), Australia (39.8 Gm^3/yr), New Zealand (20.7 Gm^3/yr), Canada (18.3 Gm^3/yr), Germany (17.4 Gm^3/yr), France (17.4 Gm^3/yr) and the Netherlands (15.0 Gm^3/yr). Although the USA is the largest gross exporter, it is in second position in the net exporters list. The reason for this is that the USA is the world's largest gross importer as well. The top seven gross importing countries are: USA (37.0 Gm^3/yr), Italy (34.1 Gm^3/yr), Japan (30.1 Gm^3/yr), South Korea (17.8 Gm^3/yr), Hong Kong (17.2 Gm^3/yr), Germany (16.4 Gm^3/yr), and France (12.5 Gm^3/yr).

There are 68 countries exporting more than 100 million cubic metres of virtual water related to trade in livestock and livestock products annually, and 118 countries which import more than 100 million cubic metres. Only 43 countries have net export and the rest of the countries in the world, a much larger number, have net import. This clearly shows that the market is characterised by a relatively small number of big exporters and a large number of importers.

According to a recent study about the virtual water flows into and from Japan (Oki *et al*., 2003), the total virtual water balance of this country is 22.3 Gm^3 per year. The study has taken only a selected number of livestock products and the net virtual water import into Japan is slightly lower than that of the present study. In the study

made by Oki *et al*., they have used constant virtual water content for each animal in different countries across the globe. This may be one of the reasons behind the conservative result of the study. Table 5.4 provides a comparison between the results of the current study and the results of Oki *et al*. (2003) for the most important exporters to Japan.

Table 5.4. Net virtual water import by Japan related to the trade in livestock and livestock products.

Exporting countries	Net import (Gm^3/yr)	
	Oki *et al.* (2003) (Period 1998-99)	Present study (Period 1995-99)
USA	9.5	13.8
Australia	5.4	10.3
Canada	1.0	0.7
Others	6.4	4.1
Grand total	22.3	28.9

The virtual water balance for each country is given in Appendix XV. The results are shown in Figure 5.2, with red for net importers and green for net exporters.
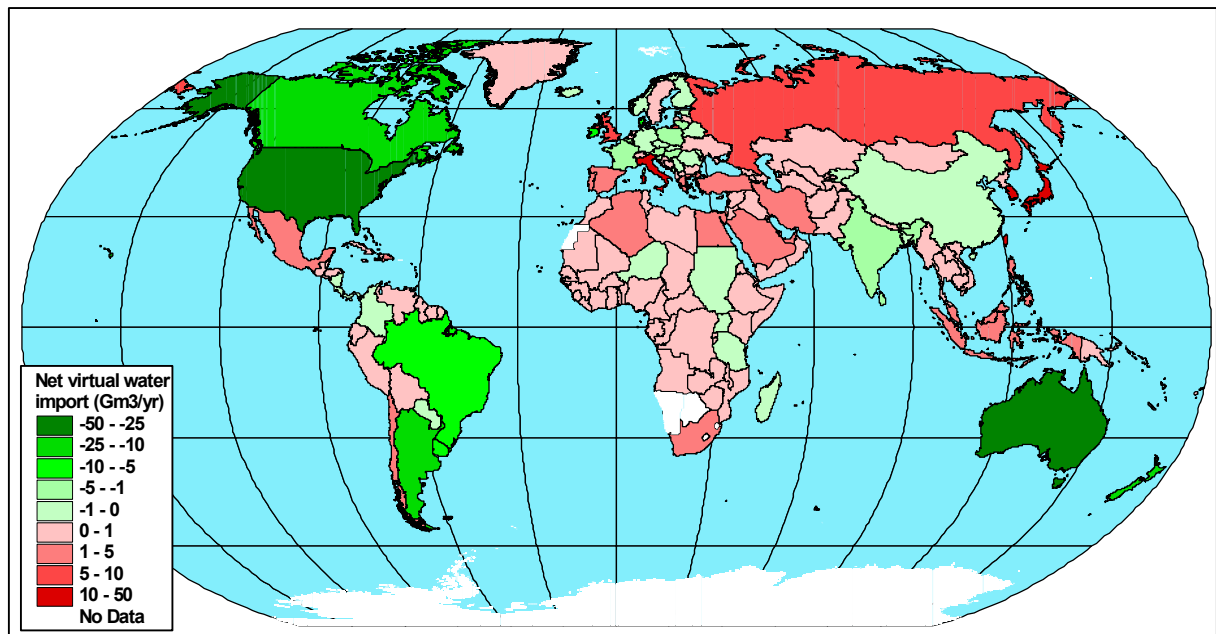
Figure 5.2. National virtual water balances related to trade in livestock and livestock products. Period: 1995-99. Green indicates net export, red net import.

5.2. Inter-regional virtual water flows

5.2.1. Sources and sinks of virtual water

To visualise the flows of virtual water in a more aggregated form, the world has been divided into thirteen regions: North America, Central America, South America, Eastern Europe, Western Europe, Central and South Asia, the Middle East, South-east Asia, North Africa, Central Africa, Southern Africa, the former Soviet Union and Oceania. A list of countries in each world region is given in Appendix XVI.

The average annual gross virtual water flows between and within regions in the period 1995-99 are presented in Table 5.5. The details of the regional flows are given in Appendix XVII. Net virtual water flows between regions in the period 1995-99 are presented in Table 5.6 and Figure 5.3. The figure only shows the flows greater than 2 Gm^3/yr.
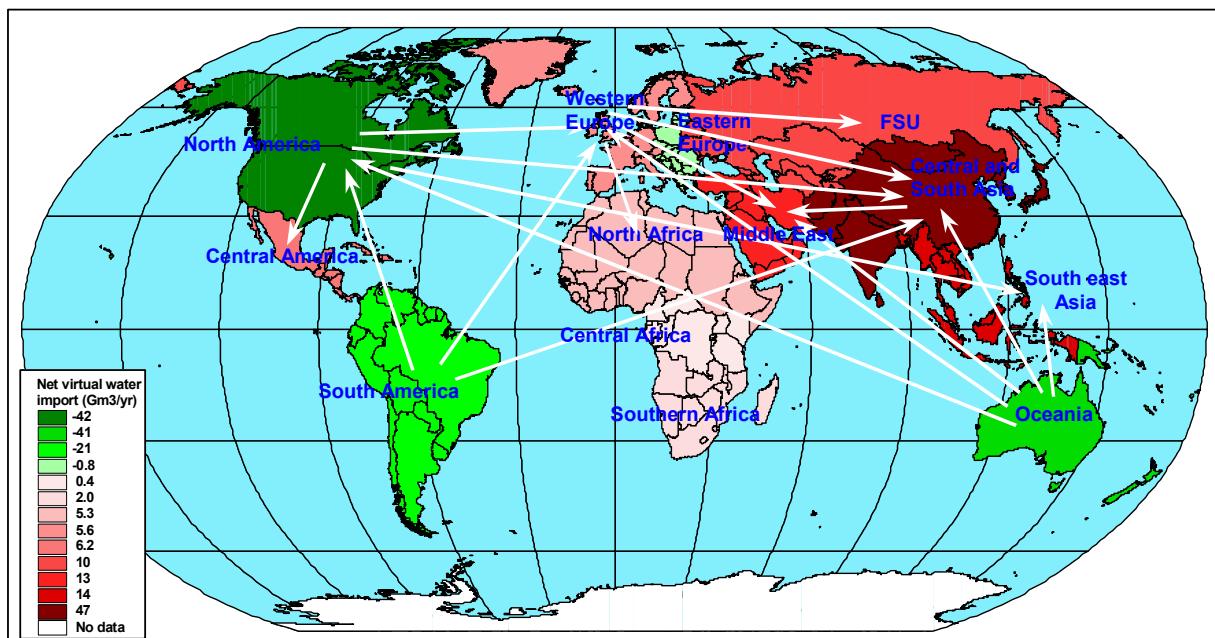
Figure 5.3. Virtual water balances related to the trade in livestock and livestock products of thirteen world regions. Period: 1995-99. Green coloured regions have net virtual water export; red coloured ones net virtual water import. The arrows show the net virtual water flows of more than 2 Gm^3 per year between regions.

Table 5.5. Gross virtual water flows between world regions in the period 1995-99 (10^6 m³/yr). The shaded cells refer to virtual water flows between countries within the regions.

Exporter \ Importer	Central Africa	Central America	Central and South Asia	Eastern Europe	Former Soviet Union	Middle East	North Africa	North America	Oceania	South America	South-east Asia	Southern Africa	Western Europe	Areas not else specified[1]	Total gross export
Central Africa	9	0.24	95	0.05	0.03	5.5	0.90	0.16	2		0.27	0.18	35		138
Central America		1356	287	0.83	4.5	4.3		3802	0	137	3	0.7	257	95	4591
Central and South Asia	44	14	10968	346	1111	2173	17	596	67	56	3605	251	2006	0.3	10286
Eastern Europe	0.40	35	180	2642	2732	567	196	191	11	30	201	11	5469	114	9738
Former Soviet Union	0.01		140	910	650	350	0.08	50		2.8	2.9		2026	0.01	3482
Middle East	0.10	3.2	129	52	71	1011	24	36	0	4.4	11	1.2	267	42	642
North Africa	4.3	0.6	43	13	0.6	440	606	1.6		0.42	0.33	0.20	217	9.5	731
North America	5.8	7892	43329	454	1205	364	396	19269	221	577	4255	336	7593		66628
Oceania	12	1318	18681	538	629	3754	1195	14930	2052	1015	7867	952	6436	1140	58466
South America	89	710	3980	192	71	1528	177	3234	31	9451	637	145	12948	92	23834
South-east Asia	2.9	5.4	1623	11	10	14	8.5	471	55	28	1797	18	1263	0.33	3510
Southern Africa	20	2.2	171	6.2	2.1	23	3.8	74	2	2	26	101	367	0.14	700
Western Europe	403	769	5505	6386	7287	4584	4058	1371	135	625	833	993	69634	324	33272
Areas not else specified															
Total gross import	581	10749	74163	8910	13124	13805	6076	24757	524	2479	17440	2708	38886	1817	216019

[1]: 'Areas not else specified' includes 'Europe EU nes', 'Middle East nes', 'Other Europe nes', 'Other Africa nes', 'Oceania nes', 'Neutral zone', 'For ships' and 'Areas nes' as defined in the PC-TAS database.

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Table 5.6. Net virtual water flows (imports-exports) between regions in the period 1995-1999 ($10^6 \ m^3/yr$).

Exporter \ Importer	Central Africa	Central America	Central and South Asia	Eastern Europe	Former Soviet Union	Middle East	North Africa	North America	Oceania	South America	South-east Asia	Southern Africa	Western Europe	Areas not else specified	Grand total
Central Africa		0.24	50.6	-0.35	0.02	5.4	-3.4	-5.7	-10	-89	-2.7	-20	-368		442
Central America	-0.24		273	-34	4.5	1.1	-0.6	-4090	-1318	-573	-2.7	-1.4	-512	95	6158
Central and South Asia	-50.6	-273		166	971	2043	-26.4	-42733	-18614	-3923	1982	80	-3499	0.28	63877
Eastern Europe	0.35	34	-166		1822	514	183	-263	-527	-162	191	4.9	-917	114	-828
Former Soviet Union	-0.02	-4.5	-971	-1822		278	-0.5	-1155	-629	-68	-7.2	-2.1	-5261	0.01	9642
Middle East	-5.4	-1.1	-2043	-514	-278		-416	-327	-3754	-1524	-3.2	-22	-4316	42	13163
North Africa	3.4	0.6	26.4	-183	0.5	416		-395	-1195	-177	-8.2	-3.6	-3841	9.5	5345
North America	5.7	4090	42733	263	1155	327	395		-14708	-2656	3783	261	6223		-41872
Oceania	10	1318	18614	527	629	3754	1195	14708		984	7811	951	6301	1140	-57942
South America	89	573	3923	162	68	1524	177	2656	-984		609	143	12323	92	-21354
South-east Asia	2.7	2.7	-1982	-191	7.2	3.2	8.2	-3783	-7811	-609		-7.7	431	0.33	13930
Southern Africa	20	1.4	-80	-4.9	2.1	22	3.6	-261	-951	-143	7.7		-626	0.14	2008
Western Europe	368	512	3499	917	5261	4316	3841	-6223	-6301	-12323	-431	626		324	5614
Areas not else specified		-95	-0.28	-114	-0.01	-42	-9.5		-1140	-92	-0.33	-0.14	-324		1817
Grand total	442	6158	63877	-828	9642	13163	5345	-41872	-57942	-21354	13930	2008	5614	1817	

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5.2.2. Virtual water balance per world region

The gross virtual water imports and exports of the thirteen world regions are shown in Figure 5.4. From this figure we can easily see that four regions (Central and South Asia, North America, Oceania and Western Europe) dominate the picture of inter regional virtual water flows related to the trade in livestock and livestock products. Western Europe has a large gross export, but it is not a net exporter as it has an even larger gross import.
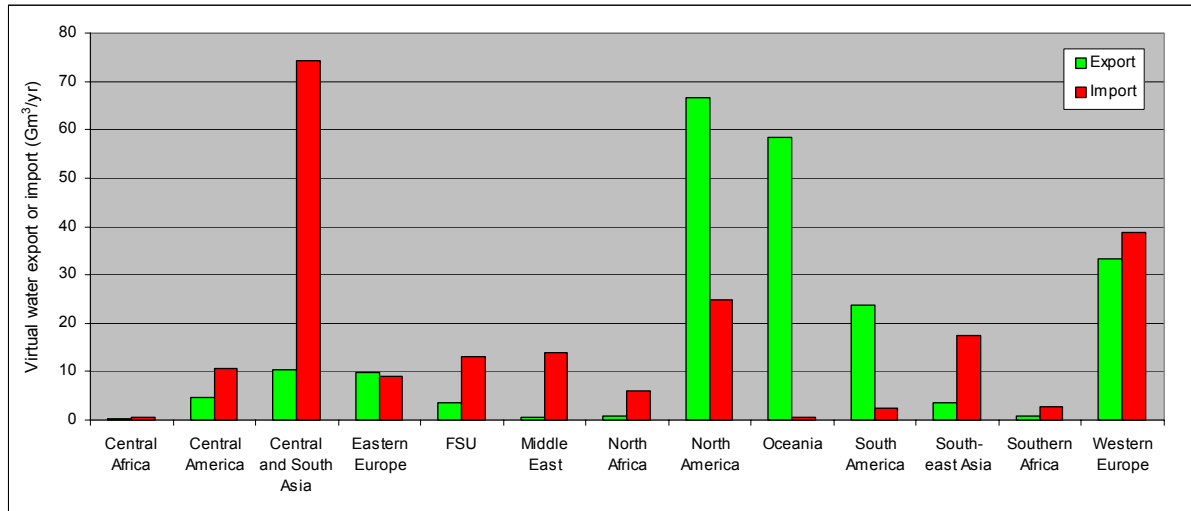
Figure 5.4. Gross virtual water import and export per region in the period 1995-99 (Gm^3/yr).

Figure 5.5 shows the net virtual water balance as the difference between gross import and gross export of a region. Regions with significant net virtual water import are Central and South Asia, the Middle East, South-east Asia and the former Soviet Union. Four other regions have net virtual water import, but less substantial: North Africa, Central America, Western Europe, Southern Africa and Central Africa. Regions with substantial net virtual water export are North America, Oceania, and South America. Eastern Europe is a less substantial exporter.
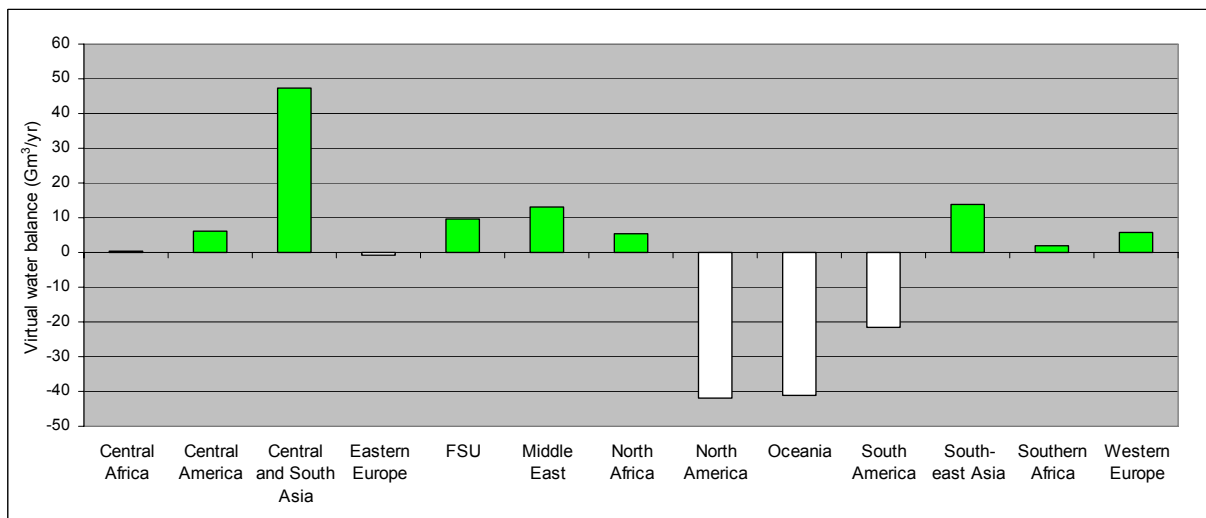
Figure 5.5. Virtual water balance per world region in the period 1995-99 (Gm^3/yr).

The thirteen world regions have been ranked by their virtual water balance in Table 5.7. North America and Oceania are by far the biggest net virtual water exporters in the world, while Central and South Asia is by far the biggest net importer. We are still talking about virtual water flows in relation to trade in livestock and livestock products only!

Table 5.7. Ranking of regions in terms of their virtual water balance related to trade in livestock products in the period 1995-99.

Rank	Region	Virtual water balance (Gm^3/yr) (gross import minus gross export)
1	North America	-41.87
2	Oceania	-41.29
3	South America	-21.35
4	Eastern Europe	-0.83
5	Central Africa	0.44
6	Southern Africa	2.01
7	North Africa	5.35
8	Western Europe	5.61
9	Central America	6.16
10	Former Soviet Union (FSU)	9.64
11	Middle East	13.16
12	South-east Asia	13.93
13	Central and South Asia	47.23

5.2.3. Gross virtual water flows between countries within regions

The volume of gross virtual water flows between countries within a region is the measure of their interdependency. The volume of international virtual water flows within a region is calculated by adding up the virtual water imports by countries from the other countries in the same region. Annual virtual water flows between countries within each of the thirteen world regions during the period 1995-99 are shown in Figure 5.6.

Western Europe has the largest internal flows of virtual water (69.6 Gm^3 per year). North America, with 19.3 Gm^3 per year, is in the second place.
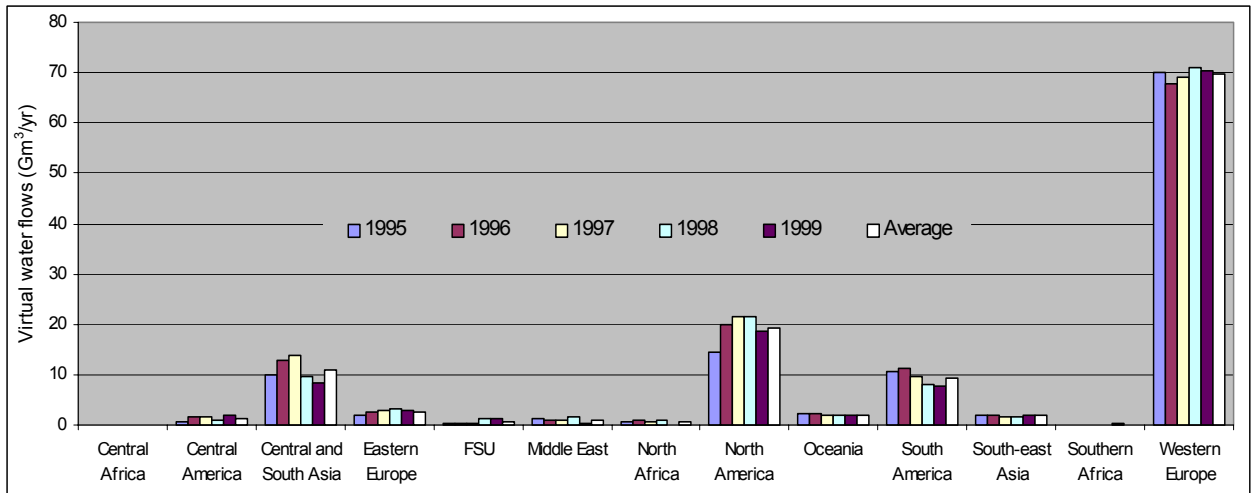
Figure 5.6. Gross virtual water flows between countries within each region in the years 1995-99 (Gm³/yr).

6. Global virtual water flows: the complete picture

6.1. International virtual water flows related to international trade in crops

We summarise here the assessment of global virtual water flows related to international trade in crops as carried out by Hoekstra and Hung (2002, 2003). The global volume of these virtual water flows averages 695 Gm^3/yr in the period 1995-99. Average national virtual water balances during this period are shown in Figure 6.1.
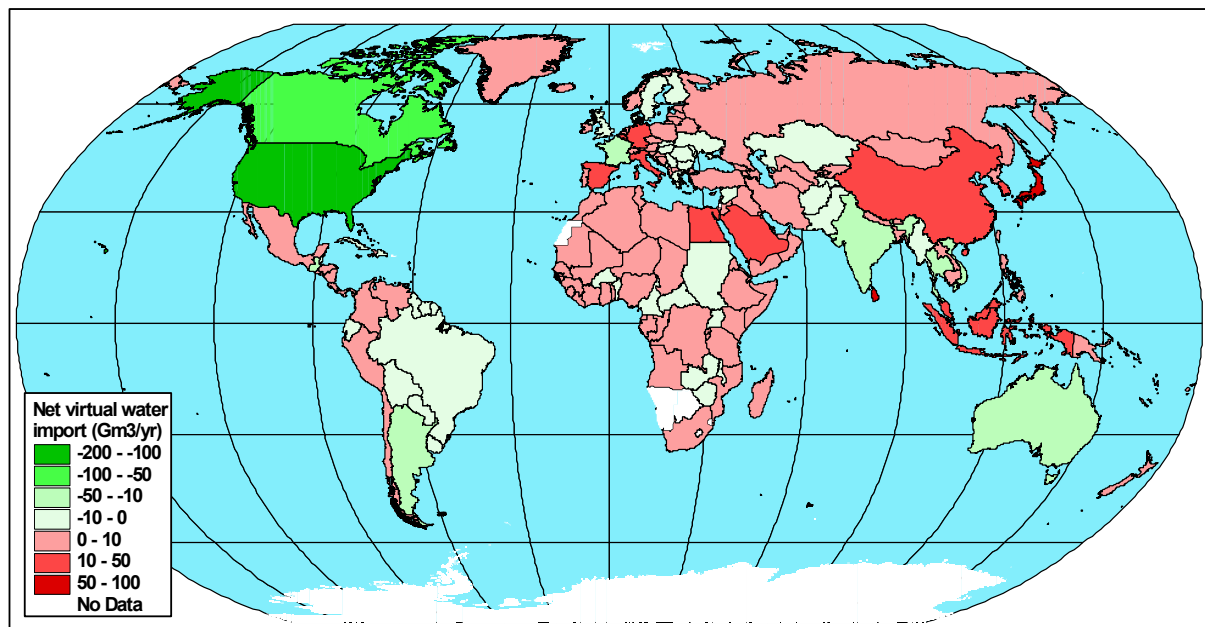
Figure 6.1. National virtual water balances relating to crop trade over the period 1995-99. Green coloured countries have net virtual water export. Red coloured countries have net virtual water import. Source: Hoekstra and Hung (2002).

Countries are ranked according to their net virtual water export from 1995 to 1999. The United States, Canada, Thailand, Argentina and India are at the top of the list. Countries with net virtual water import are ranked similarly and in this list Sri Lanka, Japan, the Netherlands, South Korea and China are in the top positions. Hoekstra and Hung (2002) give a complete list of countries and their virtual water imports and exports related to crops. The top twenty countries in each category are shown in Table 6.1.

Regional analysis by Hoekstra and Hung (2002) shows that North America is the largest net exporter (206 Gm^3/yr) and Central and South Asia is the largest net importer (167 Gm^3/yr) of virtual water associated with the international trade in crops.

Net virtual water flows between regions in the period 1995-99 are presented in Figure 6.2. The biggest trade flows (>20 Gm^3/yr) are indicated with arrows. The regions with net import are marked in red and those with net export in green.

Table 6.1. The top twenty net virtual water exporting and importing countries (1995-99). This table relates to virtual water flows associated with crop trade only.

Country	Net export volume (Gm³/yr)		Country	Net import volume (Gm³/yr)
United States	151.7	1	Sri Lanka	85.7
Canada	54.5	2	Japan	59.5
Thailand	46.7	3	Netherlands	29.5
Argentina	45.3	4	South Korea	22.5
India	32.2	5	China	20.4
Australia	29.1	6	Indonesia	20.3
Vietnam	18.0	7	Spain	16.5
France	17.7	8	Egypt	16.0
Guatemala	14.3	9	Germany	13.6
Brazil	9.0	10	Italy	12.9
Paraguay	8.4	11	Belgium	11.9
Kazakhstan	7.8	12	Saudi Arabia	10.9
Ukraine	6.4	13	Malaysia	10.3
Syria	4.3	14	Algeria	9.8
Hungary	4.0	15	Mexico	9.0
Myanmar	3.5	16	Taiwan	7.0
Uruguay	2.4	17	Colombia	6.7
Greece	2.0	18	Portugal	6.2
Dominican Republic	1.9	19	Iran	5.8
Romania	1.8	20	Bangladesh	5.7

Source: (Hoekstra and Hung, 2002)
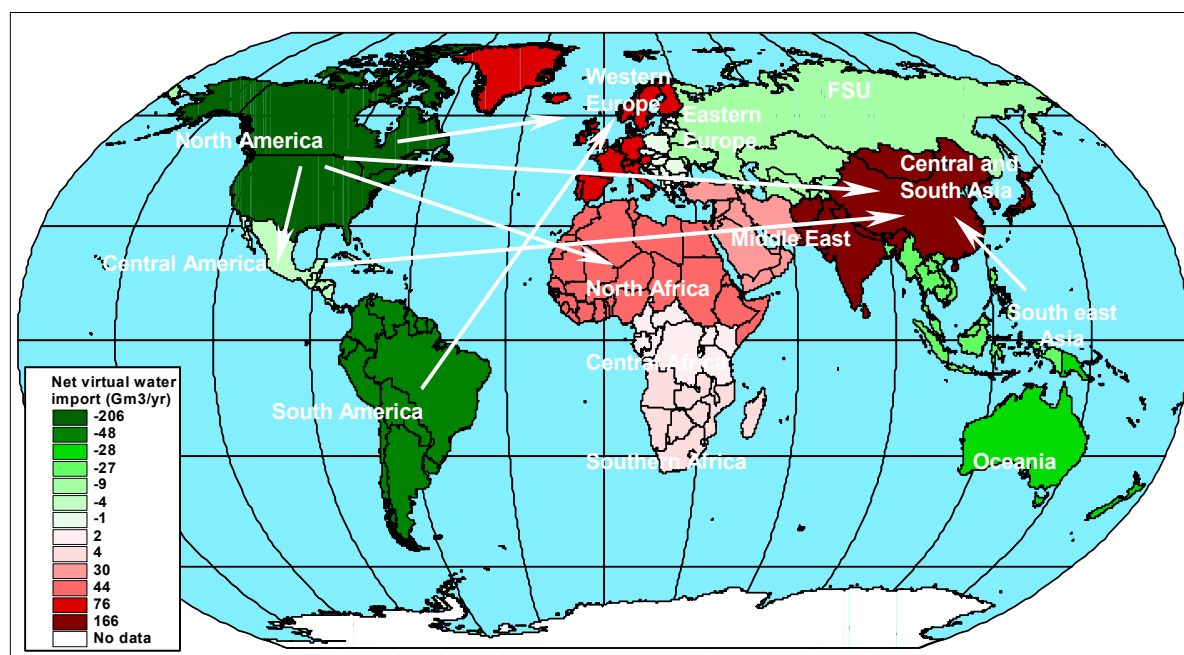
Figure 6.2. Virtual water balances of the thirteen world regions during 1995-99 in relation to the trade in crops.
Source: Hoekstra and Hung (2002).

6.2. The complete picture

The complete picture of virtual water flows arises if we combine the results from Chapter 5 with the data from Section 6.1. The global volume of international virtual water flows during the period 1995-99 was 1031 Gm^3 per year in average (Table 6.2). Virtual water flows related to the trade in livestock and livestock products constitute approximately 33 per cent of the total virtual water flows.

Table 6.2. Global volume of international virtual water flows (Gm^3/yr) during the period 1995-99.

Year	Related to trade in crops	Related to trade in livestock and livestock products	Combined
1995	559	314	874
1996	813	332	1144
1997	793	354	1147
1998	700	341	1042
1999	601	337	937
Average	695	336	1031

Total water use for crop production in the world is 5400 Gm^3/yr (Rockström and Gordon, 2001). The virtual water flows related to the international trade in agricultural products thus constitute about 19 percent of total water used for crop production. The top twelve net exporters and net importers of virtual water from the trade in agricultural products are shown in Table 6.3. The relative position of different countries in this list is more or less governed by the virtual water flows related to crop trade. However, combining the two sets of data gives a change in position for some countries. For example, New Zealand is a virtual water importer (0.89 Gm^3/yr) as regards the trade in crops (Hoeksta and Hung, 2002), but is now in ninth position in the list of net exporters, with 19.5 Gm^3/yr over the period 1995-99. The Netherlands partly balances its deficit in its crop-related virtual water balance through the export of livestock products.

Table 6.3. Top twelve countries in terms of net virtual water export and import. Period: 1995-99.

Countries with net export	Virtual water flows (Gm^3/yr)			Rank	Countries with net import	Virtual water flows (Gm^3/yr)		
	Export	Import	Net export			Export	Import	Net import
USA	248.5	66.3	-182.3	1	Japan	1.4	89.8	88.4
Australia	69.9	2.0	-67.9	2	Sri Lanka	4.0	87.7	83.7
Canada	77.6	11.8	-65.7	3	Italy	16.8	53.7	36.9
Argentina	58.5	2.6	-56.0	4	South Korea	4.4	40.4	35.9
Thailand	53.5	7.3	-46.2	5	Netherlands	20.4	45.9	25.5
India	40.4	4.4	-36.0	6	Indonesia	1.6	26.7	25.2
France	44.4	21.8	-22.6	7	China	17.1	37.0	19.9
New Zealand	20.8	1.3	-19.5	8	Hong Kong	0.8	20.3	19.5
Viet Nam	18.2	0.5	-17.7	9	Egypt	1.0	20.0	18.9
Brazil	44.4	28.3	-16.2	10	Taiwan	0.2	17.9	17.7
Guatemala	15.8	1.6	-14.2	11	Spain	12.2	29.8	17.6
Paraguay	9.7	0.9	-8.8	12	Mexico	18.7	32.0	13.3

The total net virtual water balance of different countries is shown in Figure 6.3. The green coloured countries have net virtual water export, the red coloured ones net virtual water import.
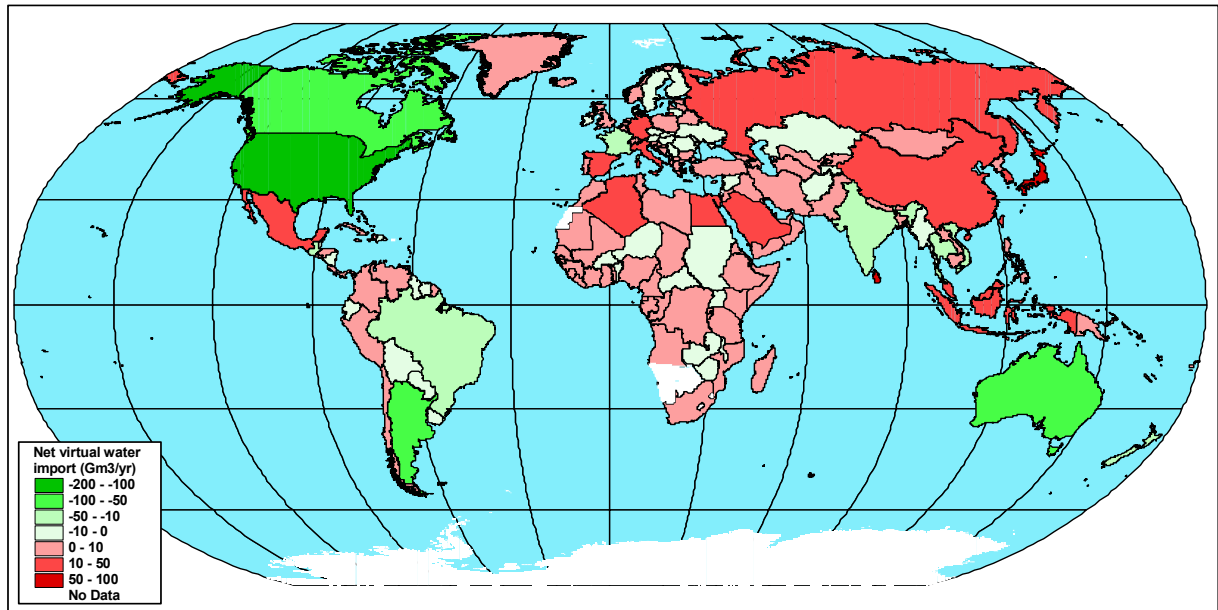
Figure 6.3. National virtual water balances. Period 1995-99.

The largest inter-regional virtual water flows are shown in Figure 6.4. The average annual gross and net virtual water flows between and within regions in the period 1995-99 are presented in Tables 6.4 and 6.5 respectively. The overall ranking of the regions regarding their virtual water balances during the period 1995-99 is given in Table 6.6. Generally a few countries dominate the regional analysis. For example, Japan (88 Gm³/yr) and Sri Lanka (84 Gm³/yr), the two largest net importers, are both in Central and South Asia, making the whole region a net importer.
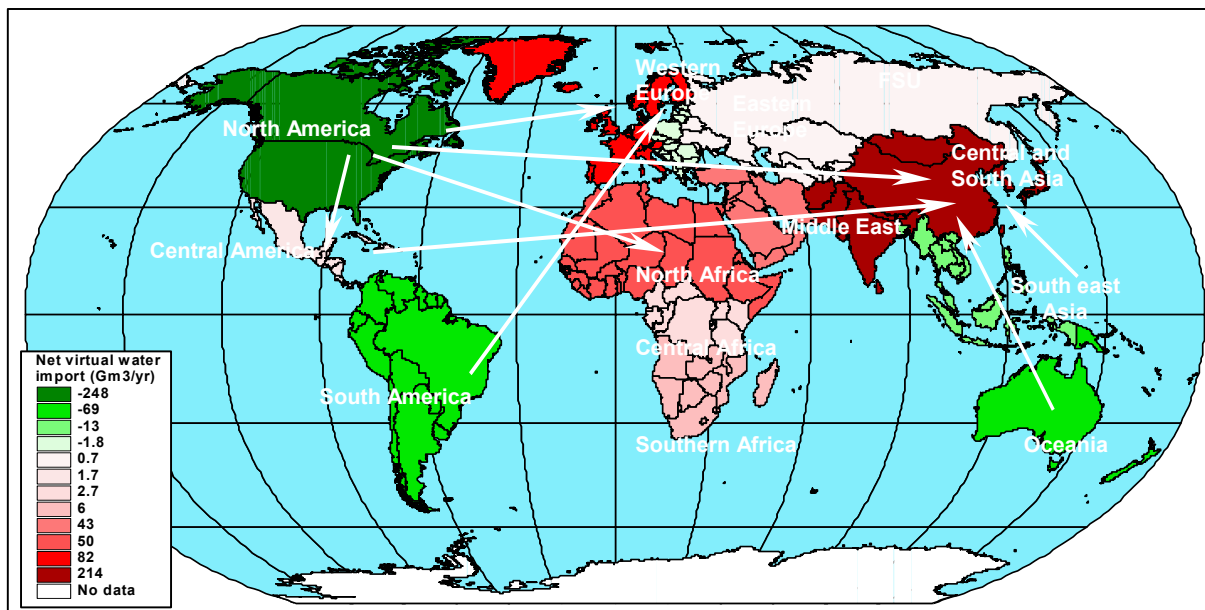
Figure 6.4. Virtual water balances of the thirteen world regions. Period: 1995-99. The biggest net flows (>20 Gm³/yr) are indicated with arrows.

Table 6.4. Gross virtual water flows between world regions in the period 1995-99 (10⁶m³/yr). The grey-shaded cells refer to gross flows between countries within the regions.

Exporter \ Importer	Central Africa	Central America	Central and South Asia	Eastern Europe	Former Soviet Union	Middle East	North Africa	North America	Oceania	South America	South-east Asia	Southern Africa	Western Europe	Areas not else specified[1]	Total gross export
Central Africa	339	0.24	117	24	2.0	20	11	10	5.7		10	128	433		760
Central America	50	2280	25191	157	862	90	306	11876	2.3	627	85	35	3123	95	42495
Central and South Asia	750	148	31048	960	3087	6501	2769	1260	147	230	16583	2139	5560	0.28	40136
Eastern Europe	4.4	65	744	6722	3778	2641	1708	303	53	46	311	35	12953	114	22756
Former Soviet Union	2.0	66	1740	3522	10386	6202	614	242	2.0	15	83		9026	0.01	21516
Middle East	158	29	2441	560	313	6141	2666	506	164	100	555	7.2	3941	42	11484
North Africa	30	31	535	241	45	1188	1154	838		922	32	86	2975	9.5	6929
North America	580	38540	122371	2356	3135	13118	26098	35825	1025	18311	20815	2304	41647		290304
Oceania	174	1398	35333	552	641	5648	3057	15468	2612	1747	14179	1520	7318	1140	88174
South America	415	2142	16438	1758	1041	5580	3903	5908	99	38797	3937	695	51190	92	93200
South-east Asia	365	433	46949	523	1206	5166	6321	3065	581	718	19237	2380	3479	0.33	71186
Southern Africa	166	138	1247	106	54	97	88	422	22	264	268	657	1899	0.14	4766
Western Europe	803	1221	17411	10180	8065	8624	9148	2387	165	943	1189	1399	119726	324	61862
Areas not else specified[1]															
Total gross import	3501	44209	270515	20942	22230	54875	56688	42281	2266	23927	58046	10730	143542	1817	755619

1: See notes on Table 5.5.

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Table 6.5. Net virtual water flows (import less export) between world regions in the period 1995-99 ($10^6 m^3/yr$).

Exporter \ Importer	Central Africa	Central America	Central and South Asia	Eastern Europe	Former Soviet Union	Middle East	North Africa	North America	Oceania	South America	South-east Asia	Southern Africa	Western Europe	Area not else specified[1]	Grand total
Central Africa		-50	-635	20	0.02	-141	-19	-570	-168	-415	-357	-38	-372		-1860
Central America	50		25041	90	796	61	275	-26664	-1398	-1515	-349	-103	1902	95	10598
Central and South Asia	635	-25041		216	1349	4059	2236	-121111	-35186	-16207	-30366	892	-11851	0.28	-102621
Eastern Europe	-20	-90	-216		256	2080	1467	-2055	-499	-1712	-209	-71	2771	114	160
Former Soviet Union	0.02	-796	-1349	-256		5888	571	-2893	-637	-1026	-1121	-54	961	0.01	18572
Middle East	141	-61	-4059	-2080	-5888		1478	-12613	-5484	-5482	-4611	-90	-4684	42	-17067
North Africa	19	-275	-2236	-1467	-571	-1478		-25263	-3057	-2981	-6290	0.44	-6173	9.47	-39071
North America	570	26664	121111	2055	2893	12613	25263		-14442	12406	17751	1881	39261		164282
Oceania	168	1398	35186	499	637	5484	3057	14442		1648	13599	1499	7153	1140	-29974
South America	415	1515	16207	1712	1026	5482	2981	-12406	-1648		3219	431	50247	92	26564
South-east Asia	357	349	30366	209	1121	4611	6290	-17751	-13599	-3219		2112	2291	0.33	40996
Southern Africa	38	103	-892	71	54	90	0.44	-1881	-1499	-431	-2112		498	0.14	-1944
Western Europe	372	-1902	11851	-2771	-961	4684	6173	-39261	-7153	-50247	-2291	-498		324	-70452
Areas not else specified		-95	-0.28	-114	-0.01	-42	-9.47		-1140	-92	-0.33	-0.14	-324		1817
Grand total	2744	1718	230375	-1816	712	43393	49761	-248026	-85910	-69272	-13136	5960	81680	1817	

1: See notes on Table 5.5.

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Table 6.6. Virtual water balance of the thirteen world regions in relation to the trade in crops, livestock and livestock products (Gm^3/yr) in the period 1995-99.

World regions	Virtual water balance (Gm^3/yr) = gross import - gross export		
	Crops	Livestock and livestock products	Total
North America	-206.2	-41.9	-248.0
South America	-47.9	-21.4	-69.3
Oceania	-28.0	-41.3	-69.3
South-east Asia	-27.1	13.9	-13.1
Eastern Europe	-1.0	-0.8	-1.8
Former Soviet Union (FSU)	-8.9	9.6	0.7
Central America	-4.4	6.2	1.7
Central Africa	2.3	0.4	2.7
Southern Africa	4.0	2.0	6.0
Middle East	30.2	13.2	43.4
North Africa	44.4	5.3	49.8
Western Europe	76.1	5.6	81.7
Central and South Asia	166.5	47.2	213.7

The complete picture of the regional analysis shows that the largest virtual water exporter is North America and the largest importer Central and South Asia. Some regions that are net exporters in relation to crops are net importers with regard to livestock products. For instance, South-east Asia has a net export of 27 Gm^3/yr from crop trade during the period 1995-99, whereas it has a net import of 14 Gm^3/yr in the same period in the form of livestock trade. FSU and Central America, net exporters in relation to the crop trade, nearly balance their trade if we take livestock and livestock products into account.

6.3. National water footprints, water self-sufficiency and water dependency

The complete list of water footprint per capita (m^3 per capita per year), water scarcity, water self-sufficiency and water dependency of nations is presented in Appendix XVIII. Countries with water footprints of more than 500 m^3/capita/year are listed in Table 6.7. The basic data on national water withdrawal and water availability for the year 1998 have been taken from AQUASTAT2000 (FAO, 2003a) and data for net virtual water import related to the trade in crops is taken from Hoekstra and Hung (2002).

The water footprints calculated in the study include the *blue water* use in the country and the import and export of virtual water. It thus excludes the *green water* consumed in a country for the production of food or other products. Zimmer and Renault (2003) have shown that on average traded virtual water makes only about 35 per cent of consumed virtual water. Hence the water footprints calculated are conservative.

The water footprint calculations have to be taken with due care. One reason is the above mentioned fact that they do not include green water use in a country. Another reason is that still quite some improvements can be made in the assessment of the international virtual water flows related to crop trade. For instance, Hoekstra and Hung (2000) have only considered a limited number of crops. Besides, virtual water flows related to industrial products such as cotton and paper have not yet been included in the analysis. Including the export of cotton - a large water user - from a country such as Uzbekistan will surely reduce its water footprint from the current estimate. Furthermore, it is important to see the origin of virtual water in a country's water footprint. What is the proportion of blue water (making a *blue water footprint*) and green water (making a *green water footprint*) in it? What were the possible alternative uses that could have been made with these resources? Answers to these questions will enable a better interpretation of the water footprint.

7. Conclusion

Although the bulk of food trade is in the form of cereals, the international virtual water flows related to trade in livestock and livestock products are quite significant (nearly half of the volume of virtual water flows related to crop trade). The reason for this is that the virtual water content of livestock products is very high compared to the virtual water content of cereal crops. A change in the diet of a nation could thus intensify or nullify virtual water imbalances. For example, if the Chinese people changed their diet to that of an average American, the virtual water balance of the Central and South Asia region, which is already a net importer of virtual water, would worsen severely.

When undertaking this study it soon became apparent that a shortage of data posed a serious problem which may be the reason why such quantifications have not been attempted thus far. Missing data have to be substituted by assumptions and best estimates, which certainly leaves room for future improvements. It also points to a general lack of quantitative information on the livestock sector, which can be partly explained by the complexity of the subject.

This is only a first step forward in defining a logical methodology to calculate the virtual water flows in relation to the international trade in livestock products; refinement of the method and collection of more reliable data are possible and necessary.

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Appendix I. Symbols

Symbol	Unit	Description
$Age_{adult}[e,a]$	day	Age of animal a when adulthood is reached
$C_{max}[e,a,c]$	ton/day	Quantity of feed crop c in daily feed composition of an adult animal
$C_{min}[e,a,c]$	ton/day	Quantity of feed crop c in daily feed composition of a baby animal
$C[e,a,c]$	ton/day	Quantity of feed crop c consumed by animal a in exporting country e
$CWR[e,c]$	m³/ha	Crop water requirement of crop c in exporting country e
$CY[e,c]$	ton/ha	Crop Yield of crop c in exporting country e
$pf[e,p]$	ton/ton	Product fraction of product p per ton of root product in exporting country e
$PT[e,i,p,t]$	ton/yr	Quantity of product export from country e to country i in year t
$PWR[e,a]$	m³/ton	Process water requirement per ton of live animal a in exporting country e
$PWR[e,p]$	m³/ton	Process water requirement per ton of root product p in exporting country e
$q_d[e,a]$	m³/day	Daily drinking water requirement of animal a in exporting country e
$q_{max}[e,a]$	m³/day	Daily drinking water requirement of an adult animal
$q_{min}[e,a]$	m³/day	Daily drinking water requirement of a baby animal
$q_{mixing}[e,a]$	m³/day	Daily water requirement for mixing the feed for animal a
$q_{serv}[e,a]$	m³/day	Daily servicing water requirement of animal a in exporting country e
$Q_{proc}[e,a]$	m³/animal	Volume of process water required per animal for producing primary products in country e
$Q_{proc}[e,p]$	m³/ ton	Volume of process water required per ton of primary products for producing secondary products in exporting country e
$SWD[e,c]$	m³/ton	Specific water demand of crop c in exporting country e
t	day	Time
$vf[e,p]$	-	Value fraction of product p in exporting country e
$v[p]$	US\$/ton	Average market price of product p
$VWC_a[e,a]$	m³/ton	Virtual water content of live animal a in exporting country e
$VWC_{feed}[e,a]$	m³/ton	Virtual water content from of live animal a in exporting country e insofar related to feeding
$VWC_{drink}[e,a]$	m³/ton	Virtual water content from drinking water supply of live animal a in exporting country e insofar related to drinking
$VWC_{serv}[e,a]$	m³/ton	Virtual water content from servicing water supply of live animal a in exporting country e insofar related to use of 'service water'
$VWC_p[e,p]$	m³/ton	Virtual water content of product p in exporting country e
$VWF[e,i,p,t]$	m³/yr	Virtual water flow from exporting country e to importing country i in the form of livestock product p in year t.
$W_a[e,a]$	ton	Weight of animal a at the end of its life span in exporting country e
$W_p[e,p]$	ton	Weight of primary product p

Dimension	Number of elements	Description	Size	Remarks
t	$[1, n_t]$	Years	$n_t = 5$	1995-1999
c	$[1, n_c]$	Crop types	$n_c = 38$	See Hoekstra and Hung (2002)
a	$[1, n_a]$	Kinds of animal[1]	$n_a = 8$	See Table 3.2
p	$[1, n_p]$	Livestock products	$n_p = 128$	See Appendix II
e	$[1, n_e]$	Exporting countries	$n_e = 219$	See Appendix VII
i	$[1, n_i]$	Importing countries	$n_i = 219$	See Appendix VII

[1] *Remark: Each individual product p originates from one particular animal type a.*

Appendix II. List of livestock products in PC-TAS

PC-TAS product group	PC-TAS product code	Livestock products
AA	010111	Horses, live pure-bred breeding
AA	010119	Horses, live except pure-bred breeding
AA	010120	Asses, mules and hinnies, live
AA	010210	Bovine, live pure-bred breeding
AA	010290	Bovine, live except pure-bred breeding
AA	010310	Swine, live pure-bred breeding
AA	010391	Swine, live except pure-bred breeding weighing less than 50 kg
AA	010392	Swine, live except pure-bred breeding weighing 50 kg or more
AA	010410	Sheep, live
AA	010420	Goats, live
AA	010511	Fowls, live domestic weighing not more than 185 g
AA	010519	Poultry, live except domestic fowls, weighing not more than 185 g
AA	010599	Poultry, live except domestic fowls, weighing more than 185 g
AA	010600	Animals, live, not else specified
AB	020110	Bovine carcasses and half carcasses, fresh or chilled
AB	020120	Bovine cuts bone in, fresh or chilled
AB	020130	Bovine cuts boneless, fresh or chilled
AB	020210	Bovine carcasses and half carcasses, frozen
AB	020220	Bovine cuts bone in, frozen
AB	020230	Bovine cuts boneless, frozen
AB	020311	Swine carcasses and half carcasses, fresh or chilled
AB	020312	Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled
AB	020319	Swine cuts, fresh or chilled, not else specified
AB	020321	Swine carcasses and half carcasses, frozen
AB	020322	Hams, shoulders and cuts thereof, of swine, bone in, frozen
AB	020329	Swine cuts, frozen not else specified
AB	020410	Lamb carcasses and half carcasses, fresh or chilled
AB	020421	Sheep carcasses and half carcasses, fresh or chilled
AB	020422	Sheep cuts, bone in, fresh or chilled
AB	020423	Sheep cuts, boneless, fresh or chilled
AB	020430	Lamb carcasses and half carcasses, frozen
AB	020441	Sheep carcasses and half carcasses, frozen
AB	020442	Sheep cuts, bone in, frozen
AB	020443	Sheep cuts, boneless, frozen
AB	020450	Goat meat, fresh, chilled or frozen
AB	020500	Horse, ass, mule or hinny meat, fresh, chilled or frozen
AB	020610	Bovine edible offal, fresh or chilled
AB	020621	Bovine tongues, edible offal, frozen

PC-TAS product group	PC-TAS product code	Livestock products
AB	020622	Bovine livers, edible offal, frozen
AB	020629	Bovine edible offal, frozen, not else specified
AB	020630	Swine edible offal, fresh or chilled
AB	020641	Swine livers, edible offal, frozen
AB	020649	Swine edible offal, frozen, not else specified
AB	020680	Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled
AB	020690	Sheep, goats, asses, mules or hinnies edible offal, frozen
AB	020810	Rabbit or hare meat and edible meat offal, fresh, chilled or frozen
AB	020820	Frog legs, fresh, chilled or frozen
AB	020890	Meat and edible meat offal, not else specified, fresh, chilled or frozen
AY	020900	Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or cured
AC	021011	Hams, shoulders and cuts thereof, of swine bone in, cured
AC	021012	Bellies, streaky and cuts thereof, swine cured
AC	021019	Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved
AC	021020	Bovine meat cured
AC	021090	Meat & edible meat offal cured not else specified & edible meat or offal, flours & meals
AY	030510	Fish meal fit for human consumption
AG	040110	Milk not concentrated and unsweetened not exceeding 1% fat
AG	040120	Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat
AG	040130	Milk and cream not concentrated and unsweetened exceeding 6% fat
AG	040210	Milk powder not exceeding 1.5% fat
AG	040221	Milk and cream powder unsweetened exceeding 1.5% fat
AG	040229	Milk and cream powder sweetened exceeding 1.5% fat
AG	040291	Milk and cream unsweetened, not else specified
AG	040299	Milk and cream not else specified sweetened
AG	040310	Yogurt concentrated or not, sweetened or not, flavoured or contg, fruit or cocoa
AG	040390	Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified
AG	040410	Whey whether or not concentrated or sweetened
AG	040490	Products consisting of natural milk constituents sweetened or not, not else specified
AG	040610	Cheese, fresh (including whey cheese) unfermented, and curd
AG	040620	Cheese, grated or powdered, of all kinds
AG	040630	Cheese processed, not grated or powdered
AG	040640	Cheese, blue-veined
AG	040690	Cheese not else specified
AG	040700	Eggs, bird, in shell, fresh, preserved or cooked
AG	040811	Egg yolks dried
AG	040819	Egg yolks not else specified

PC-TAS product group	PC-TAS product code	Livestock products
AG	040891	Eggs, bird, not in shell, dried
AG	040899	Eggs, bird, not in shell not else specified
AY	041000	Edible products of animal origin not else specified
AZ	050100	Hair, human, unworked washed or scoured or not and waste
AZ	050210	Bristles, hair and waste of pigs, hogs or boars
AZ	050290	Hair and waste of badger and of other brushmaking hair
AZ	050300	Horsehair & waste put up or not as a layer with or without supg material
AZ	050400	Guts, bladders and stomachs of animals except fish whole or in pieces
AZ	051110	Semen bovine
AC	160100	Sausage & similar products of meat, meat offal / blood & food prepared based on these products
AC	160210	Homogenized preparations of meat and meat offal
AC	160220	Livers of any animal prepared or preserved
AC	160231	Turkey meat and meat offal prepared or preserved, excluding livers
AC	160239	Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers
AC	160241	Hams and cuts thereof of swine prepared or preserved
AC	160242	Shoulders and cut thereof of swine prepared or preserved
AC	160249	Swine meat cured, not else specified
AC	160250	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved
AC	160290	Meat, meat offal or blood, prepared or preserved, not else specified
AY	160300	Extracts & juices of meat, fish, or crust, molluscs/other aquatic invertebrate
HA	410110	Bovine skins, whole, raw
HA	410121	Bovine hides, whole, fresh or wet-salted
HA	410122	Butts and bends, bovine, fresh or wet-salted
HA	410129	Hide sections, bovine, not else specified, fresh or wet-salted
HA	410130	Bovine hides, raw, not else specified
HA	410140	Equine hides and skins, raw
HA	410210	Sheep or lamb skins, raw, with wool on, not else specified
HA	410221	Sheep or lamb skins, pickled, without wool on
HA	410229	Sheep or lamb skins, raw, o/t pickled, without wool on
HA	410310	Goat or kid hides and skins, raw, not else specified
HA	410390	Raw hides and skins of animals, not else specified s
HB	410410	Bovine skin leather, whole
HB	410421	Bovine leather, vegetable pre-tanned, not else specified
HB	410422	Bovine leather, otherwise pre-tanned, not else specified
HB	410429	Bovine and equine leather, tanned or retanned, not else specified
HB	410431	Bovine and equine leather, full/split grains, not else specified
HB	410439	Bovine and equine leather, not else specified

PC-TAS product group	PC-TAS product code	Livestock products
HB	410511	Sheep or lamb skin leather, vegetable pre-tanned
HB	410512	Sheep or lamb skin leather, otherwise pre-tanned
HB	410519	Sheep or lamb skin leather, tanned or retanned, not else specified
HB	410520	Sheep or lamb skin leather, not else specified
HB	410611	Goat or kid skin leather, vegetable pre-tanned
HB	410612	Goat or kid skin leather, otherwise pre-tanned
HB	410619	Goat or kid skin leather, tanned or retanned, not else specified
HB	410620	Goat or kid skin leather, not else specified
HB	410710	Swine leather, not else specified
HB	410790	Leather, not else specified
HB	410800	Chamois (including combination chamois) leather
HB	410900	Patent leather and patent laminated leather; metallised leather
HB	411000	Parings and other waste of leather; leather dust, powder and flour
HB	411100	Composition leather, in slabs, sheets or strip
HZ	420400	Articles of leather or of composition leather, for technical uses
HZ	420500	Articles of leather or of composition leather, not else specified

Appendix III. Livestock products and their share of global trade (1995-99)

Product code	Product name	Quantity (ton/yr)	Value (10³ US$/yr)	Share of total trade value (%)
040690	Cheese not else specified	2008562	7729440	8.7
020130	Bovine cuts boneless, fresh or chilled	1100354	4561610	5.1
020230	Bovine cuts boneless, frozen	2173175	4541572	5.1
410431	Bovine and equine leather, full/split grains, not else specified	239435	4304938	4.9
010290	Bovine, live except pure-bred breeding	2116354	4124842	4.6
020329	Swine cuts, frozen not else specified	1396956	3554016	4.0
040221	Milk and cream powder unsweetened exceeding 1.5% fat	1434520	3285853	3.7
040210	Milk powder not exceeding 1.5% fat	1540442	2988496	3.4
020120	Bovine cuts bone in, fresh or chilled	900042	2843375	3.2
410121	Bovine hides, whole, fresh or wet-salted	1563531	2736820	3.1
020319	Swine cuts, fresh or chilled, not else specified	887462	2372575	2.7
410439	Bovine and equine leather, not else specified	135322	2297269	2.6
040120	Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	4401999	1882985	2.1
020312	Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled	923953	1867709	2.1
160100	Sausage & similar products of meat, meat offal / blood & food prepared based on these products	593593	1536637	1.7
050400	Guts, bladders and stomachs of animals except fish whole or in pieces	375906	1342880	1.5
021019	Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved	318407	1312166	1.5
040630	Cheese processed, not grated or powdered	364447	1297805	1.5
020311	Swine carcasses and half carcasses, fresh or chilled	682413	1248895	1.4
010392	Swine, live except pure-bred breeding weighing 50 kg or more	909982	1248704	1.4
020110	Bovine carcasses and half carcasses, fresh or chilled	331441	1182740	1.3
160239	Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers	344320	1165899	1.3
410422	Bovine leather, otherwise pre-tanned, not else specified	499603	1138069	1.3
040610	Cheese, fresh (including whey cheese) unfermented, and curd	385077	1089072	1.2
160250	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	417934	1087278	1.2
040700	Eggs, bird, in shell, fresh, preserved or cooked	881556	1059829	1.2
040130	Milk and cream not concentrated and unsweetened exceeding 6% fat	592575	937490	1.1
410520	Sheep or lamb skin leather, not else specified	17046	917205	1.0
410429	Bovine and equine leather, tanned or retanned, not else specified	1510410	896257	1.0
040291	Milk and cream unsweetened, not else specified	705251	768473	0.87

Product code	Product name	Quantity (ton/yr)	Value (10³ US$/yr)	Share of total trade value (%)
410410	Bovine skin leather, whole	90861	750517	0.85
040410	Whey whether or not concentrated or sweetened	1486879	729061	0.82
160249	Swine meat cured, not else specified	265431	715722	0.81
420500	Articles of leather or of composition leather, not else specified	87487	688355	0.78
020442	Sheep cuts, bone in, frozen	302416	632067	0.71
010111	Horses, live pure-bred breeding	6542	618173	0.70
010410	Sheep, live	542183	617153	0.70
040390	Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified	498890	580728	0.65
020410	Lamb carcasses and half carcasses, fresh or chilled	155733	577003	0.65
040310	Yogurt concentrated or not, sweetened or not, flavoured or contg, fruit or cocoa	527600	565740	0.64
160241	Hams and cuts thereof of swine prepared or preserved	124214	539221	0.61
020629	Bovine edible offal, frozen, not else specified	344702	499653	0.56
010119	Horses, live except pure-bred breeding	165655	496345	0.56
020220	Bovine cuts bone in, frozen	256832	471102	0.53
410210	Sheep or lamb skins, raw, with wool on, not else specified	200828	436542	0.49
410900	Patent leather and patent laminated leather; metallised leather	29826	405210	0.46
010511	Fowls, live domestic weighing not more than 185 g	25624	394978	0.45
410110	Bovine skins, whole, raw	173260	386942	0.44
020500	Horse, ass, mule or hinny meat, fresh, chilled or frozen	133876	376889	0.42
040620	Cheese, grated or powdered, of all kinds	83527	376267	0.42
040299	Milk and cream not else specified sweetened	297343	369366	0.42
010210	Bovine, live pure-bred breeding	163108	361760	0.41
040640	Cheese, blue-veined	56087	351434	0.40
020890	Meat and edible meat offal, not else specified, fresh, chilled or frozen	68451	344760	0.39
020649	Swine edible offal, frozen, not else specified	422208	342422	0.39
020443	Sheep cuts, boneless, frozen	138077	340378	0.38
020322	Hams, shoulders and cuts thereof, of swine, bone in, frozen	179188	340202	0.38
010600	Animals, live, not else specified	69357	326148	0.37
410221	Sheep or lamb skins, pickled, without wool on	41252	313694	0.35
410710	Swine leather, not else specified	29274	310456	0.35
040110	Milk not concentrated and unsweetened not exceeding 1% fat	931937	290860	0.33
010391	Swine, live except pure-bred breeding weighing less than 50 kg	130882	289191	0.33
020610	Bovine edible offal, fresh or chilled	117727	237530	0.27
020422	Sheep cuts, bone in, fresh or chilled	57268	228427	0.26
040229	Milk and cream powder sweetened exceeding 1.5% fat	110740	227527	0.26

Product code	Product name	Quantity (ton/yr)	Value (10³ US$/yr)	Share of total trade value (%)
020621	Bovine tongues, edible offal, frozen	70780	212779	0.24
160231	Turkey meat and meat offal prepared or preserved, excluding livers	72628	208576	0.23
410790	Leather, not else specified	6855	206530	0.23
160242	Shoulders and cut thereof of swine prepared or preserved	75125	204174	0.23
020321	Swine carcasses and half carcasses, frozen	151668	200769	0.23
410390	Raw hides and skins of animals, not else specified s	141635	184683	0.21
020810	Rabbit or hare meat and edible meat offal, fresh, chilled or frozen	55061	178386	0.20
021012	Bellies, streaky and cuts thereof, swine cured	57375	177008	0.20
040490	Products consisting of natural milk constituents sweetened or not, not else specified	161323	174103	0.20
160220	Livers of any animal prepared or preserved	43064	169727	0.19
410620	Goat or kid skin leather, not else specified	5622	168446	0.19
020900	Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or curd	266529	165661	0.19
410130	Bovine hides, raw, not else specified	124464	161071	0.18
410519	Sheep or lamb skin leather, tanned or retanned, not else specified	10089	160863	0.18
020430	Lamb carcasses and half carcasses, frozen	80286	149294	0.17
410800	Chamois (including combination chamois) leather	6825	143672	0.16
051110	Semen bovine	1803	139901	0.16
411100	Composition leather, in slabs, sheets or strip	44410	138067	0.16
411000	Parings and other waste of leather; leather dust, powder and flour	112748	134596	0.15
410619	Goat or kid skin leather, tanned or retanned, not else specified	7303	134324	0.15
020622	Bovine livers, edible offal, frozen	145685	128817	0.15
021011	Hams, shoulders and cuts thereof, of swine bone in, cured	26910	119211	0.13
040899	Eggs, bird, not in shell not else specified	86948	110646	0.12
050210	Bristles, hair and waste of pigs, hogs or boars	25182	108463	0.12
420400	Articles of leather or of composition leather, for technical uses	14304	93304	0.11
020423	Sheep cuts, boneless, fresh or chilled	22503	91812	0.10
160290	Meat, meat offal or blood, prepared or preserved, not else specified	26976	89678	0.10
010519	Poultry, live except domestic fowls, weighing not more than 185 g	4702	85457	0.10
020630	Swine edible offal, fresh or chilled	155150	84936	0.10
410421	Bovine leather, vegetable pre-tanned, not else specified	12892	84475	0.10
410129	Hide sections, bovine, not else specified, fresh or wet-salted	79455	83756	0.09
410512	Sheep or lamb skin leather, otherwise pre-tanned	11364	81799	0.09
020210	Bovine carcasses and half carcasses, frozen	51785	80822	0.09

Product code	Product name	Quantity (ton/yr)	Value (103 US$/yr)	Share of total trade value (%)
041000	Edible products of animal origin not else specified	7988	80121	0.09
040819	Egg yolks not else specified	40482	80002	0.09
010599	Poultry, live except domestic fowls, weighing more than 185 g	46437	72245	0.08
160300	Extracts & juices of meat, fish, or crust, molluscs/other aquatic invertebrate	15873	69053	0.08
020421	Sheep carcasses and half carcasses, fresh or chilled	30011	68392	0.08
410122	Butts and bends, bovine, fresh or wet-salted	31929	67783	0.08
021090	Meat & edible meat offal cured not else specified & edible meat or offal, flours & meals	39012	66955	0.08
020690	Sheep, goats, asses, mules or hinnies edible offal, frozen	48821	59241	0.07
040891	Eggs, bird, not in shell, dried	15230	58689	0.07
410229	Sheep or lamb skins, raw, o/t pickled, without wool on	19595	57256	0.06
021020	Bovine meat cured	6411	52149	0.06
020441	Sheep carcasses and half carcasses, frozen	47930	50879	0.06
160210	Homogenized preparations of meat and meat offal	18762	44616	0.05
010310	Swine, live pure-bred breeding	13570	44074	0.05
020641	Swine livers, edible offal, frozen	65842	43213	0.05
040811	Egg yolks dried	10490	40888	0.05
020450	Goat meat, fresh, chilled or frozen	15330	40846	0.05
010420	Goats, live	23842	39508	0.04
020820	Frog legs, fresh, chilled or frozen	39503	29304	0.03
410310	Goat or kid hides and skins, raw, not else specified	7239	27960	0.03
410511	Sheep or lamb skin leather, vegetable pre-tanned	3796	27585	0.03
410612	Goat or kid skin leather, otherwise pre-tanned	2600	27228	0.03
410140	Equine hides and skins, raw	13608	21445	0.02
050300	Horsehair & waste put up or not as a layer with or without supg material	4092	19573	0.02
030510	Fish meal fit for human consumption	15090	19174	0.02
050290	Hair and waste of badger and of other brush making hair	2845	18763	0.02
020680	Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled	7923	10769	0.01
410611	Goat or kid skin leather, vegetable pre-tanned	1086	6511	0.01
050100	Hair, human, un-worked washed or scoured or not and waste	57766	3296	0.004
010120	Asses, mules and hinnies, live	6898	2485	0.003
	Total		88758531	100

Appendix IV. Classification of livestock products based on animal category and their contribution to global trade.

Animal category	Product	Average trade value in year 1995-1999 (billion US$/yr)	Contribution to total trade (%)
Beef cattle		33.5	37.7
	– Bovine cuts boneless, fresh or chilled		
	– Bovine cuts boneless, frozen		
	– Bovine and equine leather, full/split grains, not else specified		
	– Bovine, live except pure-bred breeding		
	– Bovine cuts bone in, fresh or chilled		
	– Bovine hides, whole, fresh or wet-salted		
	– Bovine and equine leather, not else specified		
	– Bovine carcasses and half carcasses, fresh or chilled		
	– Bovine leather, otherwise pre-tanned, not else specified		
	– Bovine meat and meat offal not else specified, excluding livers, prepared or preserved		
	– Bovine and equine leather, tanned or retanned, not else specified		
	– Bovine skin leather, whole		
	– Bovine edible offal, frozen, not else specified		
	– Bovine cuts bone in, frozen		
	– Bovine skins, whole, raw		
	– Bovine, live pure-bred breeding		
	– Bovine edible offal, fresh or chilled		
	– Bovine tongues, edible offal, frozen		
	– Bovine hides, raw, not else specified		
	– Semen bovine		
	– Bovine livers, edible offal, frozen		
	– Bovine leather, vegetable pre-tanned, not else specified		
	– Hide sections, bovine, not else specified, fresh or wet-salted		
	– Bovine carcasses and half carcasses, frozen		
	– Butts and bends, bovine, fresh or wet-salted		
	– Bovine meat cured		
	– Equine hides and skins, raw		
Dairy cows		23.6	26.6
	– Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified		
	– Cheese not else specified		
	– Cheese processed, not grated or powdered		
	– Cheese, blue-veined		

Animal category	Product	Average trade value in year 1995-1999 (billion US$/yr)	Contribution to total trade (%)
	– Cheese, fresh (including whey cheese) unfermented, and curd		
	– Cheese, grated or powdered, of all kinds		
	– Milk and cream not concentrated and unsweetened exceeding 6% fat		
	– Milk and cream not else specified sweetened		
	– Milk and cream powder sweetened exceeding 1.5% fat		
	– Milk and cream powder unsweetened exceeding 1.5% fat		
	– Milk and cream unsweetened, not else specified		
	– Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat		
	– Milk not concentrated and unsweetened not exceeding 1% fat		
	– Milk powder not exceeding 1.5% fat		
	– Products consisting of natural milk constituents sweetened or not, not else specified		
	– Whey whether or not concentrated or sweetened		
	– Yoghurt concentrated or not, sweetened or not, flavoured or containing, fruit or cocoa		
Swine		15.1	17.0
	– Bellies, streaky and cuts thereof, swine cured		
	– Bristles, hair and waste of pigs, hogs or boars		
	– Hams and cuts thereof of swine prepared or preserved		
	– Hams, shoulders and cuts thereof, of swine bone in, cured		
	– Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled		
	– Hams, shoulders and cuts thereof, of swine, bone in, frozen		
	– Shoulders and cut thereof of swine prepared or preserved		
	– Swine carcasses and half carcasses, fresh or chilled		
	– Swine carcasses and half carcasses, frozen		
	– Swine cuts, fresh or chilled, not else specified		
	– Swine cuts, frozen not else specified		
	– Swine edible offal, fresh or chilled		
	– Swine edible offal, frozen, not else specified		
	– Swine leather, not else specified		
	– Swine livers, edible offal, frozen		
	– Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved		
	– Swine meat cured, not else specified		
	– Swine, live except pure-bred breeding weighing 50 kg or more		
	– Swine, live except pure-bred breeding weighing less than 50 kg		
	– Swine, live pure-bred breeding		

Animal category	Product	Average trade value in year 1995-1999 (billion US$/yr)	Contribution to total trade (%)
Sheep		4.8	5.4
	– Lamb carcasses and half carcasses, fresh or chilled		
	– Lamb carcasses and half carcasses, frozen		
	– Sheep carcasses and half carcasses, fresh or chilled		
	– Sheep carcasses and half carcasses, frozen		
	– Sheep cuts, bone in, fresh or chilled		
	– Sheep cuts, bone in, frozen		
	– Sheep cuts, boneless, fresh or chilled		
	– Sheep cuts, boneless, frozen		
	– Sheep or lamb skin leather, not else specified		
	– Sheep or lamb skin leather, otherwise pre-tanned		
	– Sheep or lamb skin leather, tanned or retanned, not else specified		
	– Sheep or lamb skin leather, vegetable pre-tanned		
	– Sheep or lamb skins, pickled, without wool on		
	– Sheep or lamb skins, raw, o/t pickled, without wool on		
	– Sheep or lamb skins, raw, with wool on, not else specified		
	– Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled		
	– Sheep, goats, asses, mules or hinnies edible offal, frozen		
	– Sheep, live		
Goats		0.44	0.50
	– Goat meat, fresh, chilled or frozen		
	– Goat or kid hides and skins, raw, not else specified		
	– Goat or kid skin leather, not else specified		
	– Goat or kid skin leather, otherwise pre-tanned		
	– Goat or kid skin leather, tanned or retanned, not else specified		
	– Goat or kid skin leather, vegetable pre-tanned		
	– Goats, live		
Fowls / Poultry		2.1	2.4
	– Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers		
	– Fowls, live domestic weighing not more than 185 g		
	– Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or curd		
	– Poultry, live except domestic fowls, weighing more than 185 g		
	– Poultry, live except domestic fowls, weighing not more than 185 g		
	– Turkey meat and meat offal prepared or preserved, excluding livers		

Animal category	Product	Average trade value in year 1995-1999 (billion US$/yr)	Contribution to total trade (%)
Laying hens		1.4	1.5
	− Egg yolks dried		
	− Egg yolks not else specified		
	− Eggs, bird, in shell, fresh, preserved or cooked		
	− Eggs, bird, not in shell not else specified		
	− Eggs, bird, not in shell, dried		
Horses		1.5	1.7
	− Asses, mules and hinnies, live		
	− Horse, ass, mule or hinny meat, fresh, chilled or frozen		
	− Horsehair & waste put up or not as a layer with or without supg material		
	− Horses, live except pure-bred breeding		
	− Horses, live pure-bred breeding		
Others		6.3	7.1
	− Animals, live, not else specified		
	− Articles of leather or of composition leather, for technical uses		
	− Articles of leather or of composition leather, not else specified		
	− Chamois (including combination chamois) leather		
	− Composition leather, in slabs, sheets or strip		
	− Edible products of animal origin not else specified		
	− Extracts & juices of meat, fish, or crust, molluscs/other aquatic invertebrt		
	− Fish meal fit for human consumption		
	− Frog legs, fresh, chilled or frozen		
	− Guts, bladders and stomachs of animals except fish whole or in pieces		
	− Hair and waste of badger and of other brush making hair		
	− Hair, human, un-worked washed or scoured or not and waste		
	− Homogenized preparations of meat and meat offal		
	− Leather, not else specified		
	− Livers of any animal prepared or preserved		
	− Meat & edible meat offal cured not else specified & edible meat or offal, flours & meals		
	− Meat and edible meat offal, not else specified, fresh, chilled or frozen		
	− Meat, meat offal or blood, prepared or preserved, not else specified		
	− Parings and other waste of leather; leather dust, powder and flour		
	− Patent leather and patent laminated leather; metallised leather		
	− Rabbit or hare meat and edible meat offal, fresh, chilled or frozen		
	− Raw hides and skins of animals, not else specified s		
	− Sausage & similar products of meat, meat offal / blood & food prepared based on these products		

Appendix V. Product tree per animal category

Beef cattle

- Bovine, live pure-bred breeding
- Bovine, live except pure-bred breeding
  - Bovine carcasses and half carcasses, fresh or chilled
    - Bovine carcasses and half carcasses, frozen
    - Bovine cuts bone in, fresh or chilled
      - Bovine cuts bone in, frozen
      - Bovine cuts boneless, fresh or chilled
        - Bovine cuts boneless, frozen
    - Bovine meat cured
  - Bovine edible offal, fresh or chilled
    - Bovine tongues, edible offal, frozen
    - Bovine livers, edible offal, frozen
    - Bovine edible offal, frozen not else specified
    - Bovine meat and meat offal nes,excluding livers, prepared or preserved
  - Semen bovine
  - Bovine skins, whole, raw
    - Bovine skin leather, whole
  - Bovine hides, raw, not else specified
    - Bovine hides, whole, fresh or wet-salted
      - Bovine leather, vegetable pre-tanned, not else specified
      - Bovine leather, otherwise pre-tanned, not else specified
      - Bovine/equine leather, tanned/retanned, not else specified
      - Bovine and equine leather, full/split grains, not else specified
    - Hide sections, bovine, not else specified, fresh or wet-salted
    - Butts and bends, bovine, fresh or wet-salted
  - Equine hides and skins, raw → Bovine/equine leather, not else specifid

Dairy cows

Whole milk

Milk not concentrated and unsweetened not exceeding 1% fat

Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat

Milk and cream not concentrated and unsweetened exceeding 6% fat

Milk and cream not else specified sweetened

Milk powder not exceeding 1.5% fat

Milk and cream powder unsweetened exceeding 1.5% fat

Milk and cream powder sweetened exceeding 1.5% fat

Milk and cream unsweetened, not else specified

Buttermilk,curdled milk & cream,kephir & ferm or acid milk & cream not else specified

Products consisting of natural milk constituents sweetened or not, not else specified

Yogurt concentratd or not,sweetend or not, flavourd or contg fruit or cocoa

Cheese, fresh (including whey cheese) unfermented, and curd

Cheese, grated or powdered, of all kinds

Cheese processed, not grated or powdered

Cheese, blue-veined

Cheese, not else specified

Whey whether or not concentrated or sweetened

```
┌──────────┐
│  Swine   │
└──────────┘
  │
  ├──▶ ┌─────────────────────────────────────┐
  │    │ Swine, live pure-bred breeding      │
  │    └─────────────────────────────────────┘
  │
  ├──▶ ┌─────────────────────────────────────┐
  │    │ Swine, live except pure-bred breeding│
  │    │ weighing less than 50 kg            │
  │    └─────────────────────────────────────┘
  │
  └──▶ ┌─────────────────────────────────────┐
       │ Swine, live except pure-bred breeding│
       │ weighing 50 kg or more              │
       └─────────────────────────────────────┘
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- Swine leather, not else specified
- Bristles, hai and waste of pigs, hogs or boars
- Swine carcasses and half carcasses, fresh or chilled
  - Swine carcasses and half carcasses, frozen
  - Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled
    - Hams, shoulders and cuts thereof, of swine, bone in, frozen
    - Hams, shoulders and cuts thereof, of swine bone in, cured
    - Hams and cuts thereof of swine prepared or preserved
    - Shoulders and cut thereof of swine prepared or preserved
- Swine cuts, fresh or chilled, not else specified
  - Swine cuts, frozen not else specified
  - Bellies, streaky and cuts thereof, swine cured
- Swine meat cured, not else specified
- Swine edible offal, fresh or chilled
  - Swine livers, edible offal, frozen
  - Swine meat & meat offal not else specified/ excluding livers/ including mixtures,prepard or preserved
  - Swine edible offal, frozen not else specified

Sheep

Sheep, live

Lamb carcasses and half carcasses, fresh or chilled

Lamb carcasses and half carcasses, frozen

Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled

Sheep, goats, asses, mules or hinnies edible offal, frozen

Sheep carcasses and half carcasses, fresh or chilled

Sheep cuts, bone in, fresh or chilled

Sheep cuts, bone in, frozen

Sheep cuts, boneless, fresh or chilled

Sheep cuts, boneless, frozen

Sheep carcasses and half carcasses, frozen

Sheep or lamb skins, raw, with wool on, not else specified

Sheep or lamb skins, raw, without pickled, without wool on

Sheep or lamb skins, pickled, without wool on

Sheep or lamb skin leather, vegetable pre-tanned

Sheep or lamb skin leather, otherwise pre-tanned

Sheep or lamb skin leather, tanned or retanned, not else specified

Sheep or lamb skin leather, not else specified

Goats

Goats, live

Goat meat, fresh, chilled or frozen

Goat or kid hides and skins, raw, not else specified

Goat or kid skin leather, vegetable pre-tanned

Goat or kid skin leather, otherwise pre-tanned

Goat or kid skin leather, tanned/retanned, not else specified

Goat or kid skin leather, not else specified

Appendix V - 4

Fowls/ Poultry

→ Poultry, live except domestic fowls, weighing not more than 185 g

→ Poultry, live except domestic fowls, weighing more than 185 g

→ Pig fat lean meat free & poultry fat unrenderd, fresh,chilled,frozen or cured

→ Fowls, live domestic weighing not more than 185 g

→ Turkey meat and meat offal prepared or preserved, excluding livers

→ Dom fowl,duck,goose & guinea fowl meat & meat offal prepared /preserved excluding livers

Laying hens

→ Eggs, bird, in shell, fresh, preserved or cooked

→ Eggs, bird, not in shell, not else specified → Eggs, bird, not in shell, dried

→ Egg yolks, not else specified → Egg yolks dried

Horses

→ Asses, mules and hinnies, live

→ Horses, live pure-bred breeding

→ Horses, live except pure-bred breeding

→ Horse, ass, mule or hinny meat, fresh, chilled or frozen

→ Horsehair&waste put up or not as a layer with or without supg material

For the following livestock products, the source animal is not clear from the PC-TAS database. As a product tree could not be plotted for these products, we have simplified the tree by assuming these products are best represented by other products already identified within previous animal categories.

Product code	Product description	Assumed product
010600	Animals, live not else specified	Bovine, live pure-bred breeding
020810	Rabbit or hare meat and edible meat offal, fresh, chilled or frozen	Pig fat lean meat free & poultry fat unrenderd, fresh, chilled, frozen or cured
020820	Frog legs, fresh, chilled or frozen	Pig fat lean meat free & poultry fat unrenderd, fresh, chilled, frozen or cured
020890	Meat and edible offal, nes fresh, chilled/frozen	Bovine edible offal, fresh or chilled
021090	Meat&edible meat offal cured not else specified & edible meat or offal,flours & meals	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved
030510	Fish meal fit for human consumption	Fowls, live domestic weighing < 185 g
041000	Edible products of animal origin not else specified	Bovine edible offal, fresh or chilled
050100	Hair, human, unworked washed or scoured or not and waste	Bristles, hair and waste of pigs, hogs or boars
050290	Hair and waste of badger and of others	Bristles, hair and waste of pigs, hogs or boars
050400	Guts, bladders and stomachs of animals except fish whole or in pieces	Bovine edible offal, fresh or chilled
160100	Sausage & similar products of meat,meat offal/blood&food prepared based on these products	Bovine edible offal, fresh or chilled
160210	Homogenized preparations of meat and meat offal	Bovine meat and meat offal nes,excluding livers, prepared or preserved
160220	Livers of any animal prepared or preserved	Bovine livers, edible offal, frozen
160290	Meat, meat offal or blood, prepared or preserved, not else specified	Bovine edible offal, fresh or chilled
160300	Extracts & juices of meat,fish,or crust, molluscs /other aquatic invertebreta	Fowls, live domestic weighing < 185 g
410390	Raw hides and skins of animals, not else specified	Bovine skins, whole, raw
410790	Leather, not else specified	Bovine and equine leather, not else specified
410800	Chamois leather	Bovine leather, vegetable pre-tanned, not else specified
410900	Patent leather and patent laminated leather; metallised leather	Bovine leather, vegetable pre-tanned, not else specified
411000	Parings and other waste of leather; leather dust, powder and flour	Bovine leather, vegetable pre-tanned, not else specified
411100	Composition leather, in slabs, sheets or strip	Bovine leather, vegetable pre-tanned, not else specified
420400	Articles of leather or of composition leather, for technical uses	Bovine leather, vegetable pre-tanned, not else specified
420500	Articles of leather or of composition leather, not else specified	Bovine leather, vegetable pre-tanned, not else specified

Appendix VI. Product fraction, value fraction and processing water requirement per livestock product

Product code (PC-TAS)	Product name	Root product code	PWR (m³/ton of root product)	Value fraction *vf*	Product fraction *pf* (ton/ton of root product)
	Beef cattle				
010210	Bovine, live pure-bred breeding			1.00	1.00
010290	Bovine, live except pure-bred breeding			1.00	1.00
020110	Bovine carcasses and half carcasses, fresh or chilled	010210	10	0.87	0.52
020120	Bovine cuts bone in, fresh or chilled	020110		1.00	1.00
020130	Bovine cuts boneless, fresh or chilled	020120	2	1.00	0.71
020210	Bovine carcasses and half carcasses, frozen	020110		1.00	1.00
020220	Bovine cuts bone in, frozen	020120		1.00	1.00
020230	Bovine cuts boneless, frozen	020130		1.00	1.00
020610	Bovine edible offal, fresh or chilled	010210	10	0.07	0.07
020621	Bovine tongues, edible offal, frozen	020610		0.24	0.10
020622	Bovine livers, edible offal, frozen	020610		0.42	0.60
020629	Bovine edible offal, frozen, not else specified	020610		0.34	0.30
021020	Bovine meat cured	020110	5	1.00	0.98
051110	Semen bovine	010210	10	0.0039	0.0001
160250	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	020610		0.58	0.40
410110	Bovine skins, whole, raw	010210	10	0.06	0.06
410121	Bovine hides, whole, fresh or wet-salted	410130	10	1.00	0.80
410122	Butts and bends, bovine, fresh or wet-salted	410130	10	1.00	0.80
410129	Hide sections, bovine, not else specified, fresh or wet-salted	410130	10	1.00	0.80
410130	Bovine hides, raw, not else specified	010210	10	0.06	0.06
410140	Equine hides and skins, raw	010210	10	0.06	0.06
410410	Bovine skin leather, whole	410110	30	1.00	0.40
410421	Bovine leather, vegetable pre-tanned, not else specified	410121	20	1.00	0.50
410422	Bovine leather, otherwise pre-tanned, not else specified	410121	20	1.00	0.50
410429	Bovine and equine leather, tanned or retanned, not else specified	410121	20	1.00	0.50
410431	Bovine and equine leather, full/split grains, not else specified	410121	20	1.00	0.50
410439	Bovine and equine leather, not else specified	410140	30	1.00	0.40
	Dairy cows				
Raw milk	Intermediate product				
040110	Milk not concentrated and unsweetened not exceeding 1% fat	Raw milk	10	1.00	0.93

Product code (PC-TAS)	Product name	Root product code	PWR (m³/ton of root product)	Value fraction *vf*	Product fraction *pf* (ton/ton of root product)
040120	Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	Raw milk	10	1.00	0.90
040130	Milk and cream not concentrated and unsweetened exceeding 6% fat	Raw milk	10	1.00	0.50
040210	Milk powder not exceeding 1.5% fat	Raw milk	10	1.00	0.20
040221	Milk and cream powder unsweetened exceeding 1.5% fat	Raw milk	10	1.00	0.20
040229	Milk and cream powder sweetened exceeding 1.5% fat	040221	10	1.00	1.00
040291	Milk and cream unsweetened, not else specified	Raw milk	10	0.82	0.50
040299	Milk and cream not else specified sweetened	040130	5	1.00	1.00
040310	Yoghurt concentrated or not, sweetened or not, flavoured or contg, fruit or cocoa	Raw milk	10	1.00	0.80
040390	Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified	Raw milk	10	0.18	0.10
040410	Whey whether or not concentrated or sweetened	Raw milk	10	0.46	0.73
040490	Products consisting of natural milk constituents sweetened or not, not else specified	Raw milk	10	1.00	0.80
040610	Cheese, fresh (including whey cheese) unfermented, and curd	Raw milk	10	0.54	0.15
040620	Cheese, grated or powdered, of all kinds	040610	10	1.00	0.63
040630	Cheese processed, not grated or powdered	040610	10	1.00	0.63
040640	Cheese, blue-veined	040610	10	1.00	0.63
040690	Cheese not else specified	040610	10	1.00	0.63
Swine					
010310	Swine, live pure-bred breeding	010310		1.00	1.00
010391	Swine, live except pure-bred breeding weighing less than 50 kg	010310		1.00	1.00
010392	Swine, live except pure-bred breeding weighing 50 kg or more	010310		1.00	1.00
020311	Swine carcasses and half carcasses, fresh or chilled	010310	10	0.84	0.76
020312	Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled	020311	2	1.00	0.77
020319	Swine cuts, fresh or chilled, not else specified	020311	2	1.00	0.73
020321	Swine carcasses and half carcasses, frozen	020311		1.00	1.00
020322	Hams, shoulders and cuts thereof, of swine, bone in, frozen	020312		1.00	1.00
020329	Swine cuts, frozen not else specified	020319		1.00	1.00
020630	Swine edible offal, fresh or chilled	010310	10	0.01	0.04
020641	Swine livers, edible offal, frozen	020630		0.33	0.60
020649	Swine edible offal, frozen, not else specified	020630		1.00	1.00
021011	Hams, shoulders and cuts thereof, of swine bone in, cured	020312	5	1.00	0.98

Product code (PC-TAS)	Product name	Root product code	PWR (m³/ton of root product)	Value fraction *vf*	Product fraction *pf* (ton/ton of root product)
021012	Bellies, streaky and cuts thereof, swine cured	020319	5	1.00	0.98
021019	Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved	020311	5	1.00	0.70
050210	Bristles, hair and waste of pigs, hogs or boars	010310	10	0.02	0.01
160241	Hams and cuts thereof of swine prepared or preserved	020312	5	1.00	0.98
160242	Shoulders and cut thereof of swine prepared /preserved	020312	5	1.00	0.98
160249	Swine meat cured, not else specified	020630		0.67	0.30
410710	Swine leather, not else specified	010310	10	0.13	0.02
Sheep					
010410	Sheep, live				
020410	Lamb carcasses and half carcasses, fresh or chilled	010410	10	0.81	0.76
020421	Sheep carcasses and half carcasses, fresh or chilled	010410	10	0.81	0.53
020422	Sheep cuts, bone in, fresh or chilled	020421	5	1.00	1.00
020423	Sheep cuts, boneless, fresh or chilled	020422	5	1.00	0.80
020430	Lamb carcasses and half carcasses, frozen	020410		1.00	1.00
020441	Sheep carcasses and half carcasses, frozen	020421	5	1.00	1.00
020442	Sheep cuts, bone in, frozen	020422		1.00	1.00
020443	Sheep cuts, boneless, frozen	020423		1.00	1.00
020680	Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled	010410	10	0.07	0.08
020690	Sheep, goats, asses, mules or hinnies edible offal, frozen	020680		1.00	1.00
410210	Sheep or lamb skins, raw, with wool on, not else specified	010410	10	0.12	0.08
410221	Sheep or lamb skins, pickled, without wool on	410210	5	1.00	0.95
410229	Sheep or lamb skins, raw, o/t pickled, without wool on	410210		1.00	0.95
410511	Sheep or lamb skin leather, vegetable pre-tanned	410221	20	1.00	0.90
410512	Sheep or lamb skin leather, otherwise pre-tanned	410221	20	1.00	0.90
410519	Sheep or lamb skin leather, tanned or retanned, not else specified	410221	20	1.00	0.90
410520	Sheep or lamb skin leather, not else specified	410221	20	1.00	0.90
Goats					
010420	Goats, live				
020450	Goat meat, fresh, chilled or frozen	010420	10	0.81	0.50
410310	Goat or kid hides and skins, raw, not else specified	010420	10	0.19	0.08
410611	Goat or kid skin leather, vegetable pre-tanned	410310	20	1.00	0.90
410612	Goat or kid skin leather, otherwise pre-tanned	410310	20	1.00	0.90
410619	Goat or kid skin leather, tanned or retanned, not else specified	410310	20	1.00	0.90
410620	Goat or kid skin leather, not else specified	410310	20	1.00	0.90

Product code (PC-TAS)	Product name	Root product code	PWR (m³/ton of root product)	Value fraction vf	Product fraction pf (ton/ton of root product)
	Fowls and Poultry				
010511	Fowls, live domestic weighing not more than 185 g	010519		1.00	1.00
010519	Poultry, live except domestic fowls, weighing not more than 185 g				
010599	Poultry, live except domestic fowls, weighing more than 185 g	010519		1.00	1.00
020900	Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or curd	010599	10	1.00	0.78
160231	Turkey meat and meat offal prepared or preserved, excluding livers	010511	10	1.00	0.78
160239	Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers	010511	10	1.00	0.78
	Laying hens				
Eggs	Intermediate product				
040700	Eggs, bird, in shell, fresh, preserved or cooked	Eggs		1.00	1.00
040811	Egg yolks dried	040819		1.00	0.80
040819	Egg yolks not else specified	040700	5	1.00	0.50
040891	Eggs, bird, not in shell, dried	040899		1.00	0.75
040899	Eggs, bird, not in shell not else specified	040700	1	1.00	0.90
	Horses				
010111	Horses, live pure-bred breeding				
010119	Horses, live except pure-bred breeding				
010120	Asses, mules and hinnies, live				
020500	Horse, ass, mule or hinny meat, fresh, chilled or frozen	010111	30	0.98	0.68
050300	Horsehair & waste put up or not as a layer with or without supg material	010111	30	0.02	0.01

[1] Note: The pf and vf of raw milk and eggs are calculated as shown in Appendix IXa.

Appendix VII. Country grouping based on average annual gross national income per capita

Group 1	GNI [1] (US$/cap/yr)	Group 1	GNI [1] (US$/cap/yr)	Group 1	GNI [1] (US$/cap/yr)
Ethiopia	102	Kyrgyz Republic	318	Congo, Republic	576
Burundi	122	Zambia	330	Cameroon	596
Sierra Leone	142	Gambia	342	Uzbekistan	596
Tajikistan	176	Kenya	350	Georgia	638
Guinea-Bissau	182	Bangladesh	354	Turkmenistan	698
Niger	188	Ghana	358	Solomon Islands	714
Malawi	194	Benin	370	Cote d'Ivoire	720
Eritrea	200	Vietnam	372	Indonesia	720
Mozambique	208	Nicaragua	375	Papua New Guinea	768
Chad	212	Yemen	396	Ukraine	782
Burkina Faso	222	Mauritania	400	China	792
Rwanda	228	Mongolia	400	Honduras	800
Nepal	234	Comoros	404	Sri Lanka	820
Mali	240	India	438	Equatorial Guinea	830
Tanzania	248	Moldova	450	Djibouti	860
Madagascar	254	Pakistan	450	Guyana	870
Cambodia	266	Haiti	466	Syria	944
Nigeria	266	Angola	470	Albania	968
Sao Tome and Principe	280	Guinea	484	Bolivia	980
Central African Republic	286	Senegal	506	Kiribati	1000
Uganda	304	Armenia	512	Philippines	1094
Sudan	310	Zimbabwe	528	Vanuatu	1150
Togo	314	Azerbaijan	548	Bosnia & Herzegovina	1166
Laos	316	Bhutan	566		

[1]Source: World Bank (2002).

Other countries and regions assumed to be in '**Group 1**':

Afghanistan	Cook Islands	Lithuania	Pitcairn
Anguilla	Cuba	Martinique	Saint Vincent-Grenadines
Bermuda	Faeroe Islands	Montserrat	Somalia
British Indian Ocean Territory	Falkland Islands	Myanmar	Saint Helena
British Virgin Islands	French Southern Territories	Northern Mariana	Saint Pierre Miquelon
Cayman Islands	Gibraltar	Nauru	Tokelau
Christmas Island	Greenland	Netherlands Antilles	Turks Caicos
Cocos Islands	Guadeloupe	Niue	Tuvalu
Congo, D.R.	Libya	Norfolk Islands	Wallis Futuna Island

Group 2	GNI [1] (US$/cap/yr)	Group 2	GNI [1] (US$/cap/yr)	Group 2	GNI [1] (US$/cap/yr)
Morocco	1212	Marshall Islands	2190	Hungary	4624
Yugoslavia	1235	Colombia	2202	Croatia	4646
Cape Verde	1310	Fiji	2298	Chile	4682
Kazakhstan	1336	Jamaica	2590	Trinidad and Tobago	4824
Belarus	1364	Saint Vincent-Grenadines	2642	Czech Republic	5218
Ecuador	1364	Latvia	2678	Uruguay	6248
Bulgaria	1376	Lithuania	2720	Saint Kitts and Nevis	6472
Egypt	1376	Belize	2830	Palau	6940
Samoa	1418	Turkey	2964	Seychelles	7173
Algeria	1570	Dominica	3125	Saudi Arabia	7213
Paraguay	1600	Panama	3140	Argentina	7632
Romania	1604	South Africa	3236	Barbados	8485
Tonga	1640	Grenada	3476	Antigua and Barbuda	8594
Maldives	1648	Estonia	3546	Malta	9080
Guatemala	1658	Gabon	3606	South Korea	9340
Jordan	1658	Botswana	3672	Bahrain	9623
Iran	1664	Costa Rica	3688	Slovenia	9884
Suriname	1778	Malaysia	3722	Portugal	11040
Macedonia	1872	Mauritius	3752	Greece	12032
El Salvador	1926	Slovakia	3780	Cyprus	12250
Dominican Republic	1968	Lebanon	3792	Bahamas	13723
Russian Federation	2012	Saint Lucia	3834	New Zealand	14014
Micronesia	2048	Brazil	3972	Spain	15054
Tunisia	2078	Venezuela	3972	Macao	15208
Peru	2166	Poland	4038	New Caledonia	16033
Thailand	2174	Mexico	4568		

[1]*Source: World Bank (2002).*

Other countries and regions assumed to be in '**Group 2**':

Andorra	Iraq	Qatar
Aruba	South Korea	Reunion
French Guiana	Oman	Taiwan

Group 3	GNI[1] (US$/cap/yr)	Group 3	GNI[1] (US$/cap/yr)	Group 3	GNI[1] (US$/cap/yr)
French Polynesia	17243	Finland	24836	Iceland	28704
Kuwait	18350	Belgium	24920	USA	32422
United Arab Emirates	19200	Hong Kong	24975	Denmark	32644
Italy	20218	Singapore	25238	Norway	34956
Canada	20530	Netherlands	25418	Japan	35574
Australia	20930	Brunei	25450	Switzerland	39646
Ireland	21486	Austria	25938	Luxembourg	42742
United Kingdom	23236	Germany	25956		
France	24294	Sweden	27110		

[1]Source: World Bank (2002).

Appendix VIII.   Average world market price per livestock product (1995-99)

Product code (PC-TAS)	Product name	Average world market price[1] (US$/ton)
010600	Animals, live, not else specified	4702
420400	Articles of leather or of composition leather, for technical uses	6523
420500	Articles of leather or of composition leather, not else specified	7868
010120	Asses, mules and hinnies, live	360
021012	Bellies, streaky and cuts thereof, swine cured	3085
410431	Bovine and equine leather, full/split grains, not else specified	17980
410439	Bovine and equine leather, not else specified	16976
410429	Bovine and equine leather, tanned or retanned, not else specified	593
020110	Bovine carcasses and half carcasses, fresh or chilled	3568
020210	Bovine carcasses and half carcasses, frozen	1561
020120	Bovine cuts bone in, fresh or chilled	3159
020220	Bovine cuts bone in, frozen	1834
020130	Bovine cuts boneless, fresh or chilled	4146
020230	Bovine cuts boneless, frozen	2090
020610	Bovine edible offal, fresh or chilled	2018
020629	Bovine edible offal, frozen, not else specified	1450
410130	Bovine hides, raw, not else specified	1294
410121	Bovine hides, whole, fresh or wet-salted	1750
410422	Bovine leather, otherwise pre-tanned, not else specified	2278
410421	Bovine leather, vegetable pre-tanned, not else specified	6553
020622	Bovine livers, edible offal, frozen	884
160250	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	2602
021020	Bovine meat cured	8134
410410	Bovine skin leather, whole	8260
410110	Bovine skins, whole, raw	2233
020621	Bovine tongues, edible offal, frozen	3006
010290	Bovine, live except pure-bred breeding	1949
010210	Bovine, live pure-bred breeding	2218
050210	Bristles, hair and waste of pigs, hogs or boars	4307
040390	Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified	1164
410122	Butts and bends, bovine, fresh or wet-salted	2123
410800	Chamois (including combination chamois) leather	21050
040690	Cheese not else specified	3848
040630	Cheese processed, not grated or powdered	3561
040640	Cheese, blue-veined	6266

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[1] *Average world market price is calculated as the ratio of the total global trade value of a product to the total trade volume of the product.*

Product code (PC-TAS)	Product name	Average world market price[1] (US$/ton)
040610	Cheese, fresh (including whey cheese) unfermented, and curd	2828
040620	Cheese, grated or powdered, of all kinds	4505
411100	Composition leather, in slabs, sheets or strip	3109
160239	Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers	3386
041000	Edible products of animal origin not else specified	10030
040811	Egg yolks dried	3898
040819	Egg yolks not else specified	1976
040700	Eggs, bird, in shell, fresh, preserved or cooked	1202
040899	Eggs, bird, not in shell not else specified	1273
040891	Eggs, bird, not in shell, dried	3854
410140	Equine hides and skins, raw	1576
160300	Extracts & juices of meat, fish, or crust, molluscs/ other aquatic invertebrate	4350
030510	Fish meal fit for human consumption	1271
010511	Fowls, live domestic weighing not more than 185 g	15414
020820	Frog legs, fresh, chilled or frozen	742
020450	Goat meat, fresh, chilled or frozen	2664
410310	Goat or kid hides and skins, raw, not else specified	3862
410620	Goat or kid skin leather, not else specified	29962
410612	Goat or kid skin leather, otherwise pre-tanned	10472
410619	Goat or kid skin leather, tanned or retanned, not else specified	18393
410611	Goat or kid skin leather, vegetable pre-tanned	5996
010420	Goats, live	1657
050400	Guts, bladders and stomachs of animals except fish whole or in pieces	3572
050290	Hair and waste of badger and of other brush making hair	6596
050100	Hair, human, un-worked washed or scoured or not and waste	57
160241	Hams and cuts thereof of swine prepared or preserved	4341
021011	Hams, shoulders and cuts thereof, of swine bone in, cured	4430
020312	Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled	2021
020322	Hams, shoulders and cuts thereof, of swine, bone in, frozen	1899
410129	Hide sections, bovine, not else specified, fresh or wet-salted	1054
160210	Homogenized preparations of meat and meat offal	2378
020500	Horse, ass, mule or hinny meat, fresh, chilled or frozen	2815
050300	Horsehair & waste put up or not as a layer with or without supg material	4783
010119	Horses, live except pure-bred breeding	2996
010111	Horses, live pure-bred breeding	94493
020410	Lamb carcasses and half carcasses, fresh or chilled	3705
020430	Lamb carcasses and half carcasses, frozen	1860
410790	Leather, not else specified	30130

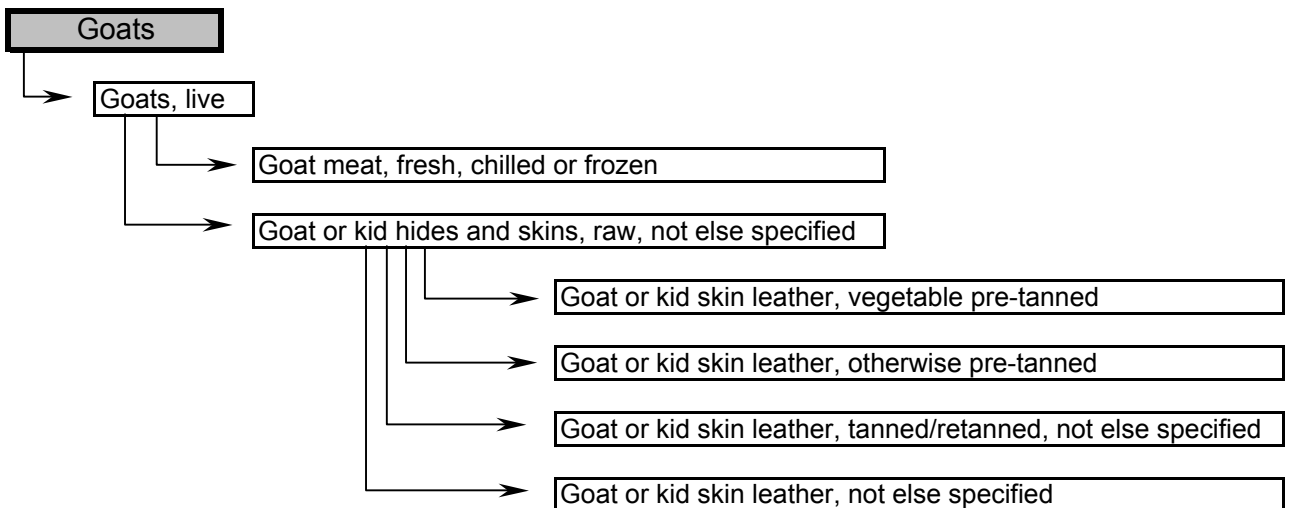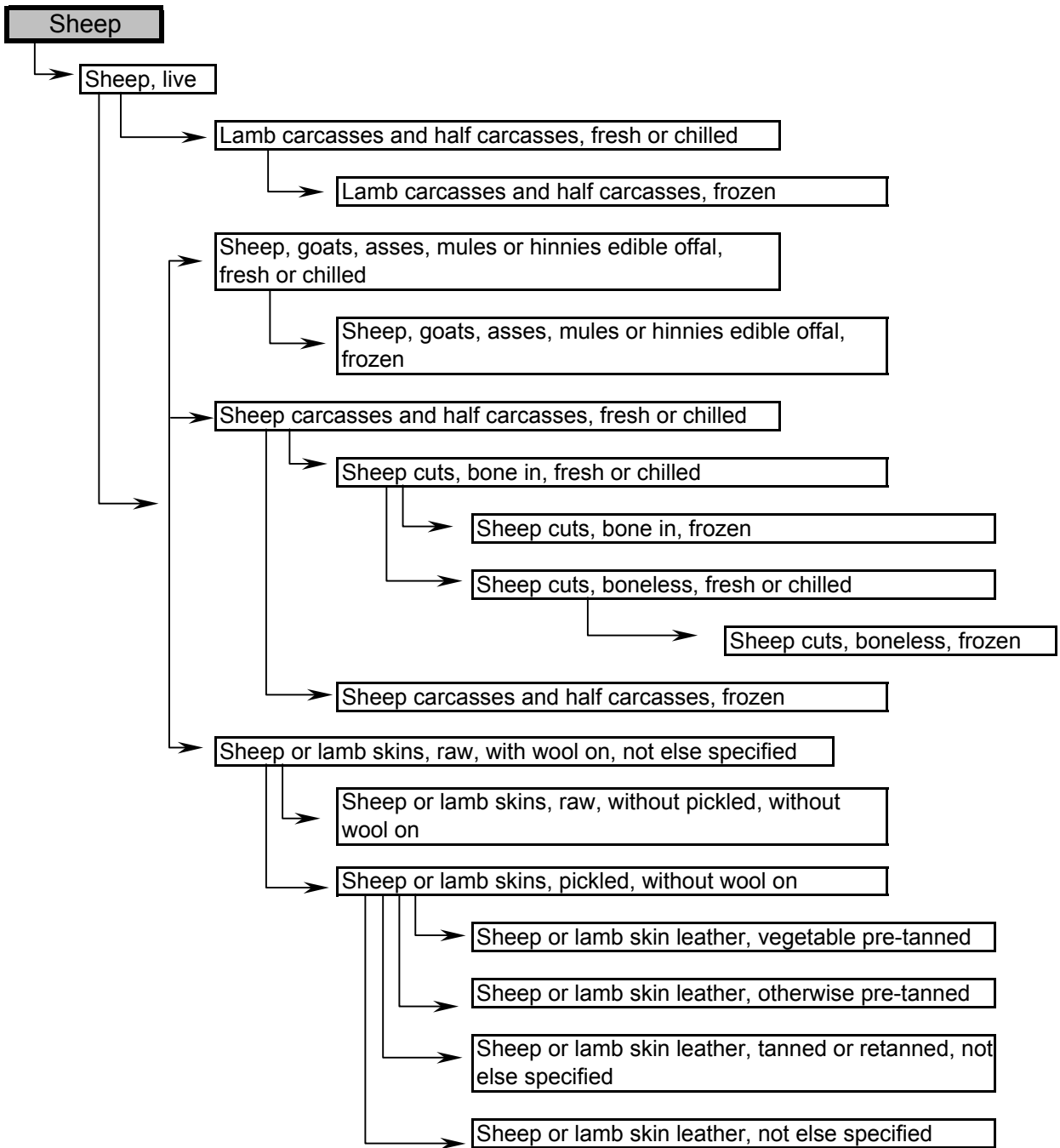| Product code (PC-TAS)	Product name	Average world market price[1] (US$/ton)
160220	Livers of any animal prepared or preserved	3941
021090	Meat & edible meat offal cured not else specified & edible meat or offal, flours & meals	1716
020890	Meat and edible meat offal, not else specified, fresh, chilled or frozen	5037
160290	Meat, meat offal or blood, prepared or preserved, not else specified	3324
040130	Milk and cream not concentrated and unsweetened exceeding 6% fat	1582
040299	Milk and cream not else specified sweetened	1242
040229	Milk and cream powder sweetened exceeding 1.5% fat	2055
040221	Milk and cream powder unsweetened exceeding 1.5% fat	2291
040291	Milk and cream unsweetened, not else specified	1090
040120	Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	428
040110	Milk not concentrated and unsweetened not exceeding 1% fat	312
040210	Milk powder not exceeding 1.5% fat	1940
411000	Parings and other waste of leather; leather dust, powder and flour	1194
410900	Patent leather and patent laminated leather; metallised leather	13586
020900	Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or curd	622
010599	Poultry, live except domestic fowls, weighing more than 185 g	1556
010519	Poultry, live except domestic fowls, weighing not more than 185 g	18174
040490	Products consisting of natural milk constituents sweetened or not, not else specified	1079
020810	Rabbit or hare meat and edible meat offal, fresh, chilled or frozen	3240
410390	Raw hides and skins of animals, not else specified s	1304
160100	Sausage & similar products of meat, meat offal / blood & food prepared based on these products	2589
051110	Semen bovine	77597
020421	Sheep carcasses and half carcasses, fresh or chilled	2279
020441	Sheep carcasses and half carcasses, frozen	1062
020422	Sheep cuts, bone in, fresh or chilled	3989
020442	Sheep cuts, bone in, frozen	2090
020423	Sheep cuts, boneless, fresh or chilled	4080
020443	Sheep cuts, boneless, frozen	2465
410520	Sheep or lamb skin leather, not else specified	53807
410512	Sheep or lamb skin leather, otherwise pre-tanned	7198
410519	Sheep or lamb skin leather, tanned or retanned, not else specified	15944
410511	Sheep or lamb skin leather, vegetable pre-tanned	7267
410221	Sheep or lamb skins, pickled, without wool on	7604
410229	Sheep or lamb skins, raw, o/t pickled, without wool on	2922
410210	Sheep or lamb skins, raw, with wool on, not else specified	2174
020680	Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled	1359
020690	Sheep, goats, asses, mules or hinnies edible offal, frozen	1213
010410	Sheep, live	1138

Product code (PC-TAS)	Product name	Average world market price[1] (US$/ton)
160242	Shoulders and cut thereof of swine prepared or preserved	2718
020311	Swine carcasses and half carcasses, fresh or chilled	1830
020321	Swine carcasses and half carcasses, frozen	1324
020319	Swine cuts, fresh or chilled, not else specified	2673
020329	Swine cuts, frozen not else specified	2544
020630	Swine edible offal, fresh or chilled	547
020649	Swine edible offal, frozen, not else specified	811
410710	Swine leather, not else specified	10605
020641	Swine livers, edible offal, frozen	656
021019	Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved	4121
160249	Swine meat cured, not else specified	2696
010392	Swine, live except pure-bred breeding weighing 50 kg or more	1372
010391	Swine, live except pure-bred breeding weighing less than 50 kg	2210
010310	Swine, live pure-bred breeding	3248
160231	Turkey meat and meat offal prepared or preserved, excluding livers	2872
040410	Whey whether or not concentrated or sweetened	490
040310	Yoghurt concentrated or not, sweetened or not, flavoured or contg, fruit or cocoa	1072

Appendix IX.   Calculation of the virtual water content of live animals, example for Canada

Appendix IXa.   Calculation of the virtual water content of live animals for the 'grazing system'.

Appendix IXb.   Calculation of the virtual water content of live animals for the 'industrial system'.

Kind of animal: **Beef cattle**
Farming system: **Grazing**

Virtual water content of a live animal (VWC_a)

$$VWC_a \quad = \quad VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult bovine =   0.40 ton/animal

Water from drinking

	Calve	Adult cow
Age (month)	5	36
Range of daily consumption (l/day/animal)	5	22
Average daily consumption (l/day/animal)	13.50	

Total drinking water required   =   Avgerage daily demand * Age

                     =   14783 litre/animal   =   **14.78 m^3/animal**

Water from servicing

	Calve	Adult cow
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required   =   Avgerage daily demand * Age

                     =   2738 litre/animal   =   **2.74 m^3/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Feed crop	Feed quantity (ton/yr)			SWD	Crop water	
	Beef cattle	Beef rep heifers <1 yr	Average feed volume	(m^3/ton)	(m^3/yr)	
Wheat	0.0060	0.0016	0.0038	1441	5.48	
Oats	0.0656	0.0360	0.0508	2328	118.28	
Barley	0.1416	0.0172	0.0794	1098	87.17	
Other small grains	0.0036	0.0012	0.0024	897	2.15	
Grain corn	0.0348	0.0064	0.0206	381	7.84	
Dry peas	0.0036	0.0016	0.0026	1377	3.58	
Soyabean meal	0.0092	0.0008	0.0050	1227	6.14	
Canola meal	0.0056	0.0032	0.0044	1098	4.83	
Mill screen	0.0176	0.0044	0.0110	1441	15.85	
Total grain	0.2876	0.0724	0.1800			
Non grain portion	0.0068	0.0012	0.0040	381	1.52	Grain
Complete grain based ration	0.2944	0.0736	0.1840			253
Pasture	1.8180	0.6348	1.226	445	545.75	
Dry hay	1.2288	0.6372	0.933	494	461.32	
Silage	0.7656	0.1524	0.459	494	226.95	
Other roughages	0.3084	0.1164	0.212	445	94.52	Forage
Total roughages	4.1208	1.5408	2.831			1329

Total water consumption in the form of feed per year   =   1581 m^3/year

Total volume of water from feed = Age * water volume   =   **4744 m^3/animal**

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	2.83	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	1.42	m³/yr
Total quantity (for full life span)	**4.25**	m³/animal

Virtual water content of feed =   4744   +   4.25   =   **4748 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{14.78}{0.40} + \frac{2.74}{0.40} + \frac{4748}{0.40}$$

$$= 37 + 7 + 11871$$

$$= \textbf{11915 m}^3\textbf{/ton}$$
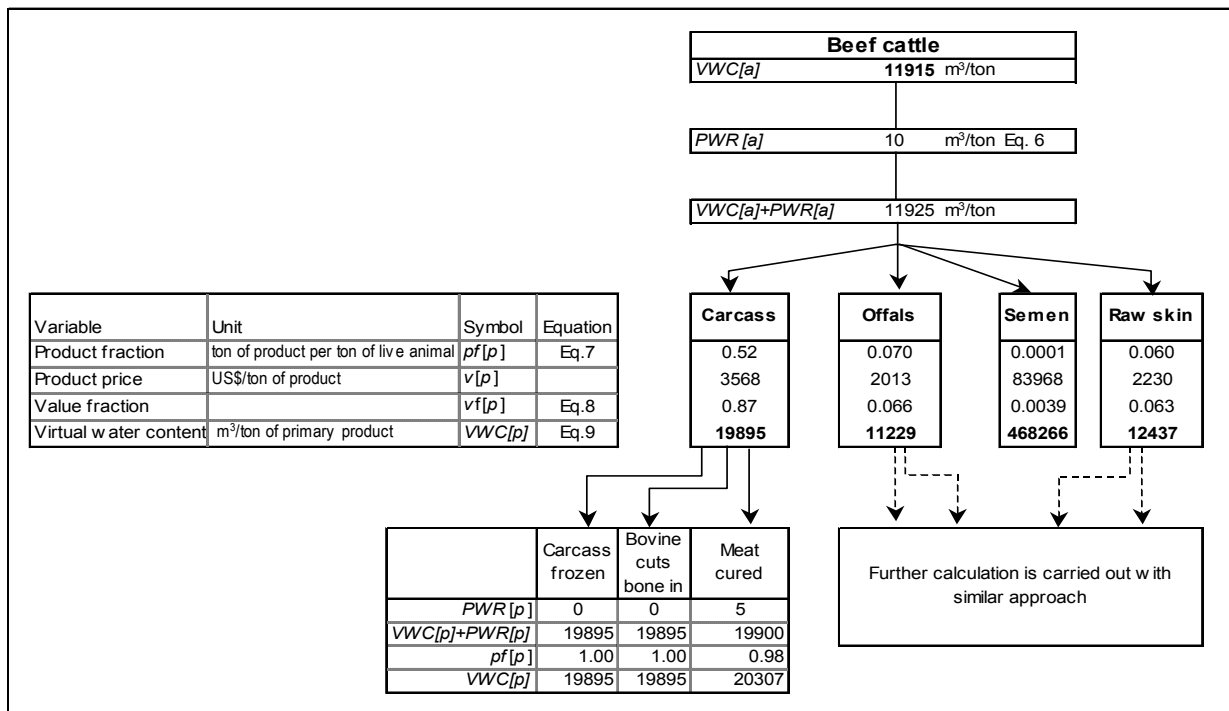
Calculation tree for virtual water content of 'bovine products'

Variable	Unit	Symbol	Equation
Product fraction	ton of product per ton of live animal	$pf[p]$	Eq.7
Product price	US$/ton of product	$v[p]$	
Value fraction		$vf[p]$	Eq.8
Virtual water content	m³/ton of primary product	$VWC[p]$	Eq.9

Beef cattle
$VWC[a]$ **11915** m³/ton

$PWR[a]$ 10 m³/ton Eq. 6

$VWC[a]+PWR[a]$ 11925 m³/ton

	Carcass	Offals	Semen	Raw skin
Product fraction	0.52	0.070	0.0001	0.060
Product price	3568	2013	83968	2230
Value fraction	0.87	0.066	0.0039	0.063
Virtual water content	**19895**	**11229**	**468266**	**12437**

	Carcass frozen	Bovine cuts bone in	Meat cured
$PWR[p]$	0	0	5
$VWC[p]+PWR[p]$	19895	19895	19900
$pf[p]$	1.00	1.00	0.98
$VWC[p]$	19895	19895	20307

Further calculation is carried out with similar approach

Kind of animal: **Dairy cows**
Farming system: **Grazing**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Water from drinking

	Calves	Heifers	Milking cows
Age (yr)	0-1	1-3	3-10
Range of daily consumption (l/day/animal)	4-18	18-30	40
Average daily consumption (l/day/animal)	11	24	40

Total drinking water required   =   11*365+24*2*365+40*7*365

          =   123735   litre/animal   =   **123.7 m³/animal**

Water from servicing

	Calves	Heifers	Milking cows
Age (yr)	0-1	1-3	3-10
Average daily consumption (l/day/animal)		4	5

Total service water required   =   0*365+4*2*365+5*7*365

          =   15695   litre/animal   =   **15.7 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Feed crop	Feed quantity (ton/yr)			SWD (m³/ton)	Crop water (m³/yr)		
	Calves < 1yrs	Heifers	Dairy cows		Calves < 1yrs	Heifers	Dairy cows
Wheat	0.00	0.01	0.02	1441	7	16	26
Oats	0.01	0.01	0.00	2328	29	13	9
Barley	0.03	0.10	0.15	1098	34	105	170
Other small grains	0.01	0.01	0.01	897	5	7	10
Grain corn	0.05	0.17	0.28	381	20	66	108
Dry peas		0.0004	0.0006	1377		1	1
Soyabean meal	0.02	0.03	0.05	1227	19	41	64
Canola meal	0.00	0.01	0.02	1098	4	13	22
Mill screen	0.01	0.03	0.04	1441	9	37	63
Total grain	0.13	0.37	0.59				
Non grain portion	0.01	0.02	0.03	381	2	7	12
Complete grain based ration	0.14	0.39	0.62				
Pasture	0.09	0.48	0.49	445	41	212	218
Dry hay	1.57	1.71	1.54	494	776	846	762
Silage	0.65	3.02	4.46	494	320	1493	2203
Other roughages	0.09	0.03		445	40	14	
Total roughages	2.40	5.24	6.49				
Total water consumption in the form of feed per year				=	1305	2872	3669
Total = Calve+ Heifer + Milking cow				=	**32079** m³/animal		

Mixing water for feed preparation

	Calves	Heifers	Milking cows
Total feed volume (ton/yr)	2.53	5.62	7.11
Mixing water required for the feed preparation approximately 50% of the total feed consumed (m³/yr)	1.27	2.81	3.55
Total quantity (for full life span)	**31**	m³/animal	

$$\text{Virtual water content of feed} = 32079 + 31 = \textbf{32110 m}^3\textbf{/animal}$$

$$VWC_a = 124 + 16 + 32110$$
$$= \textbf{32250 m}^3\textbf{/animal}$$

Distribution of virtual water content of dairy cow

1. Primary products

1. Raw milk		2. Meat	
Milk yield	2500 kg/yr	Live weight of of an adult cow	0.27 ton
Number of lactation	7		
Total milk produced	17500 kg/animal		
Product fraction (*pf*)	64.81 ton/ton of animal		

Product	Quantity (ton/animal)	Market price (US$/ton)	Value from individual product (US$)	Total value (US$/ animal)	Value fraction (*vf*)	Share of each product (m³/animal)	**VWC (m³/ton)**
Raw milk	17.50	700	12250	12993	0.943	30407	**1738**
Meat	0.27	2750	743		0.057	1843	**6826**

Kind of animal: **Dairy cows**
Farming system: **Grazing**

Dairy cow	
VWC[a]	32250 m³/animal

Live cow	Variable	Symbol	Unit	Equation		**Raw milk**
0.27	Product fraction	*pf*	ton of product **per live animal**			17.50
2750	Product price	*v*	US$/ton of product			700
0.057	Value fraction	*vf*		Eq.8		0.94
6826	Virtual water content	*VWC[p]*	m³/t of primary produ	Eq.9		**1738**

Carcass		**Offals**	**Raw skin**
0.52	*pf* (ton/ton)	0.07	0.06
3568	*value* (US$/ton)	1834	2172
0.88	*vf*	0.061	0.062
11520	*VWC* (m³/ton)	**5924**	**7014**

Calculated as shown for carcass

		Carcass frozen	Bovine cuts bone in	Meat cured	
	PWR			5	m3/ton
	VWC[p]+PWR[p]	11520	11520	11525	m3/ton
	pf	1	1	1	ton/ton
	VWC[p]	11520	11520	11760	m3/ton

Items	PWR (m³/t)	VWC + PWR (m³/t)	*pf*	*vf*	VWC (m³/t)
Milk not concentrated and unsweetened not exceeding 1% fat	10	1748	0.93	1.00	1879
Milk not conctrated & unsweetened exceeding 1% not exceeding 6% fat	10	1748	0.90	1.00	1942
Milk and cream not concentrated and unsweetened exceeding 6% fat	10	1748	0.50	1.00	3495
Milk and cream nes sweetened	5	3500	1.00	1.00	3500
Milk powder not exceeding 1.5% fat	10	1748	0.20	1.00	8738
Milk and cream powder unsweetened exceeding 1.5% fat	10	1748	0.20	1.00	8738
Milk and cream powder sweetened exceeding 1.5% fat	10	8748	1.00	1.00	8748
Milk and cream unsweetened, nes	10	1748	0.50	0.82	2880
Buttermilk,curdled milk & cream,kephir & ferm or acid milk & cream	10	1748	0.10	0.18	3076
Products consisting of natural milk constituents sweetened or not nes	10	1748	0.80	1.00	2184
Yogurt concentratd o not,sweetend o not,flavourd o contg fruit o cocoa	10	1748	0.80	1.00	2184
Whey whether or not concentrated or sweetened	10	1748	0.73	0.46	1096
Cheese, fresh (including whey cheese) unfermented, and curd	10	1748	0.15	0.54	6318
Cheese, grated or powdered, of all kinds	10	6328	0.63	1.00	10019
Cheese processed, not grated or powdered	10	6328	0.63	1.00	10019
Cheese, blue-veined	10	6328	0.63	1.00	10019
Cheese nes	10	6328	0.63	1.00	10019

Kind of animal: Swine
Farming system: Grazing

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult swine = 0.09 ton/animal

Water from drinking

	Piglet	Adult
Age (month)	0.5	12
Range of daily consumption (l/day/animal)	1.8	8.0
Average daily consumption (l/day/animal)	4.9	

Total drinking water required = Avgerage daily demand * Age

= 1789 litre/animal = **1.79 m³/animal**

Water from servicing

	Piglet	Adult
Range of daily consumption (l/day/animal)		25
Average daily consumption (l/day/animal)	12.50	

Total service water required = Avgerage daily demand * Age

= 4563 litre/animal = **4.56 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)			SWD (m³/ton)	Crop water (m³/yr)		
	Pigs	Weaner pigs	Average feed volume				
Wheat				1441			
Oats				2328			
Barley	0.047		0.024	1098	26		
Other small grains	0.135		0.068	897	61		
Grain corn				381			
Dry peas				1377			
Soyabean meal	0.024		0.012	1227	15		
Canola meal				1098			
Mill screen				1441			
Total grain	0.206		0.103				
Potatoes	0.300		0.150	468	70	Grain	
Complete grain based ration	0.506		0.253				171
Pasture							
Dry hay							
Silage							
Other roughages	0.079		0.040	445	18	Forage	
Total roughages							18
Total water consumption in the form of feed per year				=	189		
Total volume of water from feed = Age in years * water per year				=	**189** m³/animal		

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	0.25	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.13	m³/yr
Total quantity, for full life span	**0.13**	m³/animal

Virtual water content of feed = 189 + 0.13 = **189 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{1.79}{0.09} + \frac{4.56}{0.09} + \frac{189}{0.09}$$

$$= 20 + 51 + 2100$$

$$= \textbf{2170 m}^3\textbf{/ton}$$

Calculation tree for virtual water content of 'swine products'

	Swine	
VWC[a]	**2170**	m³/ton

PWR [a]	10	m³/ton Eq. 6

VWC[a]+PWR[a	2180	m³/ton

Variable	Unit	Symbol	Equation	Carcass	Offals	Leather	Bristles
Product fraction	ton of product per ton of live animal	pf[p]	Eq.7	0.76	0.040	0.020	0.0075
Product price	US$/ton of product	v[p]		1830	548	10580	5192
Value fraction		vf[p]	Eq.8	0.84	0.013	0.127	0.023
Virtual water content	m³/ton of primary product	VWC[p]	Eq.9	**2399**	**719**	**13871**	**6807**

	Carcass frozen	Hams / Shoulder / Cuts	Swine cuts fresh/chill	Swine meat cured
PWR[p]	0	2	2	5
VWC[p]+PWR[p]	2399	2401	2401	2404
pf[p]	1.00	0.77	0.73	0.70
VWC[p]	2399	3118	3289	3434

Further calculation is carried out with similar approach

Kind of animal: **Sheep**
Farming system: **Grazing**

Virtual water content of a live animal (VWC_a)

$$VWC_a \quad = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature sheep 0.04 ton/animal

Water from drinking

	5lbs lamb	Adult
Age (month)	0.2	24
Range of daily consumption (l/day/animal)	0.30	6.00
Average daily consumption (l/day/animal)	3.15	

Total drinking water required = Avgerage daily demand * Age

= 2300 litre/animal = **2.30 m³/animal**

Water from servicing

	5lbs lamb	Adult
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required = Avgerage daily demand * Age

= 1825 litre/animal = **1.83 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Rams & ewes	Average feed volume			
Wheat	0.0005	0.00025	1441	0.36	
Oats	0.0025	0.00125	2328	2.91	
Barley	0.0125	0.00625	1098	6.86	
Other small grains	0.0005	0.00025	897	0.22	
Grain corn	0.0025	0.00125	381	0.48	
Dry peas	0.0005	0.00025	1377	0.34	
Soyabean meal	0.001	0.0005	1227	0.61	
Canola meal	0.0005	0.00025	1098	0.27	
Mill screen	0.0005	0.00025	1441	0.36	
Total grain	0.021	0.0105			
Non grain portion	0.0005	0.00025	381	0.10	Grain
Complete grain based ration	0.0215	0.011			12.5
Pasture	0.178	0.089	445	39.61	
Dry hay	0.203	0.1015	494	50.19	
Silage	0.032	0.016	494	7.91	
Other roughages	0.003	0.0015	445	0.67	Forage
Total roughages	0.416				98.4

Total water consumption in the form of feed per year = 111 m³/year

Total volume of water from feed = Age in years * water per year = **222 m³/animal**

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	0.01	
Mixing water required for the feed preparation (ton/yr)		
approximately 50% of the total feed consumed	0.01	m³/yr
Total quantity (for full life span)	0.01	m³/animal

Virtual water content of feed = 222 + 0.01 = **222 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{2.30}{0.04} + \frac{1.83}{0.04} + \frac{222}{0.04}$$

$$= 57 + 46 + 5545$$

$$= \textbf{5648 m}^3\textbf{/ton}$$

Calculation tree for virtual water content of 'sheep products'

Sheep	
VWC[a]	**226** m³/ton

PWR [a]	10 m³/ton Eq. 6

VWC[a]+PWR[a]	236 m³/ton

Variable	Unit	Symbol	Equation
Product fraction	ton of product per ton of live animal	pf[p]	Eq.7
Product price	US$/ton of product	v[p]	
Value fraction		vf[p]	Eq.8
Virtual water content	m³/ton of primary product	VWC[p]	Eq.9

	Carcass	Offal	Raw skin
Product fraction	0.53	0.080	0.080
Product price	2276	1358	2172
Value fraction	0.81	0.073	0.117
Virtual water content	**361**	**215**	**344**

	Carcass frozen	Sheep cuts bone in	Raw skin, pickeld	Raw skin, without pickled
PWR [p] (m³/ton)	5	5	5	0
VWC[p]+PWR[p] (m³/ton)	366	366	349	344
pf [p] (ton/ton)	1.0	1.0	0.95	0.95
VWC[p] (m³/ton)	366	366	**368**	**362**

Ship skin, vegetable pretanned
Ship skin otherwise pretanned
Ship skin retanned, nes
Ship skin leather, nes

Further calculation is carried out with similar approach

Kind of animal:　　　　　**Goats**
Farming system:　　　　　**Grazing**

Virtual water content of a live animal (VWC_a)

$$VWC_a \quad = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature goat =　　　　　0.035　ton/animal

Water from drinking

	5lbs kid	Adult
Age (month)	0.2	30
Range of daily consumption (l/day/animal)	0.30	3.50
Average daily consumption (l/day/animal)	1.90	

Total drinking water required　　　　=　　Avgerage daily demand * Age

　　　　　　　　　　　　　　　　=　　　1734　litre/animal　=　**1.73 m³/animal**

Water from servicing

	5lbs kid	Adult
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required　　　　=　　Avgerage daily demand * Age

　　　　　　　　　　　　　　　　=　　　2281　litre/animal　=　**2.28 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)		
	Animalat slaughter	Average feed volume				
Wheat						
Oats	0.0020	0.0010	2328	2.33		
Barley	0.0065	0.0033	1098	3.57		
Other small grains	0.0005	0.0003	897	0.22		
Grain corn	0.0030	0.0015	381	0.57		
Dry peas						
Soyabean meal	0.0010	0.0005	1227	0.61		
Canola meal	0.0005	0.0003	1098	0.27		
Mill screen						
Total grain	0.0135	0.0068				
Non grain portion	0.0005	0.0003	381	0.10	Grain	
Complete grain based ration	0.0140	0.0070				7.67
Pasture	0.1560	0.0780	445	34.71		
Dry hay	0.0915	0.0458	494	22.62		
Silage	0.0015	0.0008	494	0.37		
Other roughages					Forage	
Total roughages	0.2490					57.70
Total water consumption in the form of feed per year			=	65		
Total volume of water from feed = Age in years * water per year			=	**163** m³/animal		

Mixing water for feed preparation

	Average	
Total feed volume	0.01	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.004	m³/yr
Total quantity (for full life span)	**0.01**	m³/animal

Virtual water content of feed =   163   +   0.01   =   **163 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{1.73}{0.035} + \frac{2.28}{0.035} + \frac{163}{0.035}$$

$$= \quad 50 \quad + \quad 65 \quad + \quad 4670$$

$$= \quad \textbf{4785 m}^3\textbf{/ton}$$

Calculation tree for virtual water content of 'goat products'

	Goat	
VWC[a]	**4785**	m³/ton

	PWR [a]	10	m³/ton	Eq. 6

	VWC[a]+PWR[a]	4795	m³/ton

Variable	Unit	Symbol	Equation	**Meat**	**Raw skin**
Product fraction	ton of product per ton of live animal	*pf[p]*	Eq.7	0.50	0.08
Product price	US$/ton of product	*v[p]*		2666	3806
Value fraction		*vf[p]*	Eq.8	0.81	0.186
Virtual water content	m³/ton of primary product	*VWC[p]*	Eq.9	**7806**	**11145**

	Leather vegetable pretanned	Leather otherwise pretanned	Leather retanned, nes	Leather, nes
PWR [p] (m³/ton)	20	20	20	20
VWC[p]+PWR[p] (m³/ton)	11165	11165	11165	11165
pf (ton/ton)	0.90	0.90	0.90	0.90
VWC[p] (m³/ton)	12405	12405	12405	12405

Kind of animal: **Broiler chicken**
Farming system: **Grazing**

Virtual water content of a live bird (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature broiler = 1.8 kg/bird

Water from drinking

	Chick	Adult
Age (weeks)	-	15
Range of daily consumption (l/day/bird)	0.02	0.18
Average daily consumption (l/day/bird)	0.28	

Total drinking water required = Avgerage daily demand * Age

= 29.40 litre/bird = **0.0294 m³/bird**

Water from servicing

Total service water required = assumed to be 50 percent of drinking requirement = **0.0147 m³/bird**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Adult	Average feed volume			
Wheat	0.0108	0.0054	1441	7.78	
Oats					
Barley					
Other small grains					
Grain corn	0.0102	0.0051	381	1.94	
Dry peas			1377		
Soyabean meal	0.0034	0.0017	1227	2.09	
Canola meal	0.0020	0.0010	1098	1.10	
Mill screen	0.0017	0.0009	1441	1.23	
Total grain	0.0281	0.0141			
Non grain portion	0.0065	0.0033	381	1.24	Grain
Complete grain based rat	0.0346	0.0173			15.37
Pasture					
Dry hay					
Silage					
Other roughages					
Total roughages					
Total water consumption in the form of feed per year			=	15.37	
For growing period =Total yearly value/52*(age/2)				4.43	
Total virtual water of feed per bird (m³/bird) =				**4.43** m³/bird	

Mixing water for feed preparation

	Average	
Total feed volume	0.017	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.009	m³/yr
Total quantity (for full life span)	**0.012**	m³/bird

Virtual water content of feed =

$$4.43 \quad + \quad 0.009 \quad = \quad \textbf{4.44 m}^3\textbf{/bird}$$

$$VWC_a \quad = \frac{water\,from\,drinking}{W_a} + \frac{water\,from\,servicing}{W_a} + \frac{water\,from\,feed}{W_a}$$

$$= \quad \frac{0.03}{0.0018} \quad + \quad \frac{0.01}{0.0018} \quad + \quad \frac{4.44}{0.0018}$$

$$= \quad 17 \quad + \quad 6 \quad + \quad 2467$$

$$= \quad \textbf{2489 m}^3\textbf{/ton}$$

Distribution of virtual water content of broilers to its products

Live weight	=	1.80 kg
Dressed weight	=	1.40 kg
Product fraction, *pf*	= Dressed weight/live weight	
	=	0.78
Value fraction, *vf*	=	1.00

Virtual water content of broiler meat = $VWCa * vf/pf$

$$= \quad \textbf{3200 m}^3\textbf{/ton}$$

Kind of animal: **Laying hens**   *- High egg producing varieties*
Farming system: **Grazing**

Virtual water content of a live bird (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Water from drinking

	Chick	Start of laying egg	Adult
Age (weeks)	1	25	75
Range of daily consumption (l/day/bird)	0.02	0.30	0.30
Average daily consumption (l/day/bird)	0.16		0.30

Total drinking water required   =   0.16*25*7+0.30*50*7

         =   133 litre/bird   =   **0.13 m³/bird**

Water from servicing

Total service water required   =   assumed to be 50 percent of drinking requirement   =   **0.07 m³/bird**

Water from feed

Virtual water content from feed = Mixing water for feed +Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m^3/ton)	Crop water (m^3/yr)		
	Laying hens	Average feed volume				
Wheat	0.0108	0.0054	1441	7.78		
Oats						
Barley						
Other small grains						
Grain corn	0.0102	0.0051	381	1.94		
Dry peas						
Soyabean meal	0.0034	0.0017	1227	2.09		
Canola meal	0.0020	0.0010	1098	1.10		
Mill screen	0.0017	0.0009	1441	1.23		
Total grain	0.0281	0.0141				
Non grain portion	0.0065	0.0033	381	1.24		Grain
Complete grain based ra	0.035	0.017				15.37
Pasture						
Dry hay						
Silage						
Other roughages						Forage
Total roughages						
Total water consumption in the form of feed per year =				15.37		
For growing period =Total annual value/52*(growing age/2)				3.69		
For laying period =Total annual value/52*laying period				14.78		
Total virtual water of feed per bird (m³/bird) =				**18.47** m³/bird		

Mixing water for feed preparation

	Average	
Total feed volume	0.008	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.004	m³/yr
Total quantity (for full life span)	**0.006**	m³/bird

Virtual water content of feed =   18.47   +   0.006   =   **18.48 m³/bird**

VWC_a 0.13   +   0.07   +   18.48

=   **19 m³/bird**

Distribution of virtual water content of a laying hen to its products

1. Egg		2. Carcass	
Nos of eggs produced	120 egg/bird	Live weight of bird	0.0015 ton
Weight of an egg	35 gram/egg		
Total egg produced	4.2 kg/bird		
Product fraction, *pf*	2.80 ton/ton of bird		

Product	Quantity (ton/animal)	Market price (US$/ton)	Value from individual product (US$)	Total value (US$/animal)	value fraction (*vf*)	Water share for each product (m³/animal)	VWC (m³/ton)
Egg	0.0042	1209	5.08	7.42	0.68	12.8	**3046**
Carcass	0.0015	1557	2.34		0.32	5.9	**3923**

Calculation tree for virtual water content of 'products from a laying hen'
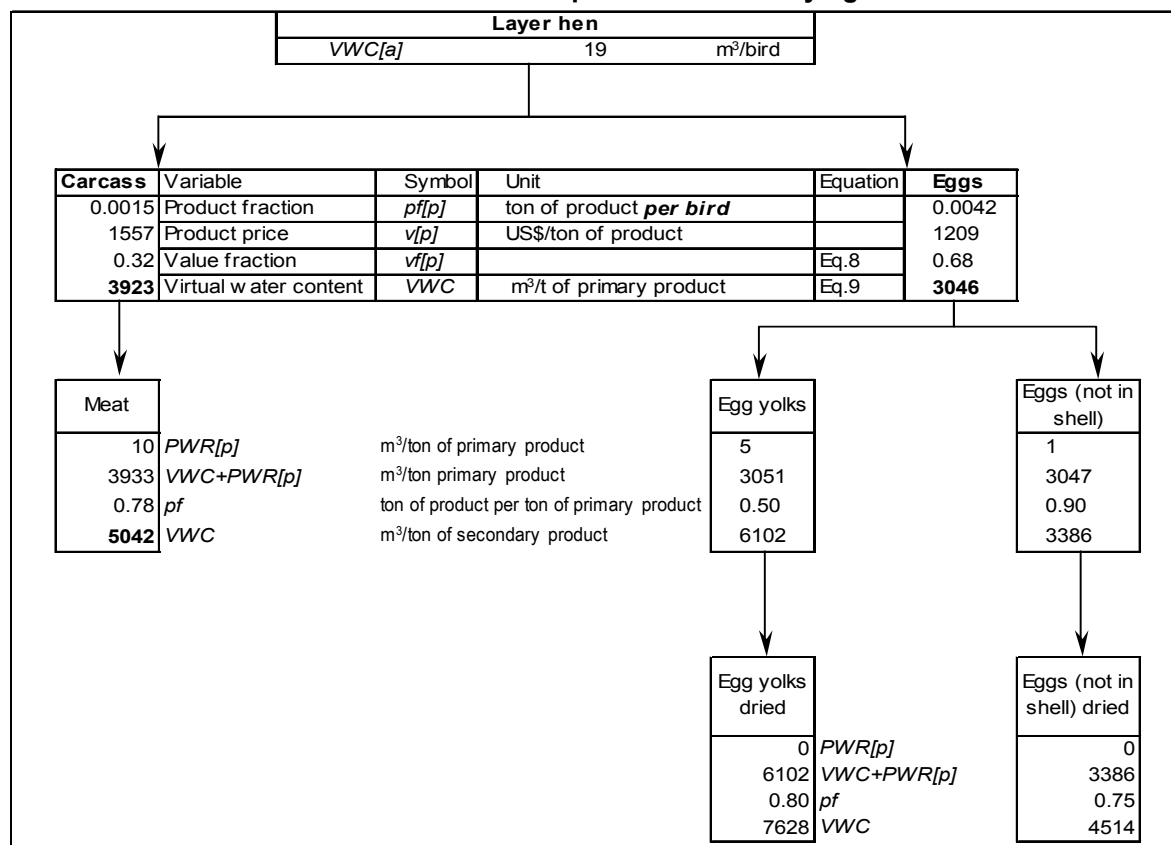
Layer hen		
VWC[a]	19	m³/bird

Carcass	Variable	Symbol	Unit	Equation	Eggs
0.0015	Product fraction	*pf[p]*	ton of product ***per bird***		0.0042
1557	Product price	*v[p]*	US$/ton of product		1209
0.32	Value fraction	*vf[p]*		Eq.8	0.68
3923	Virtual water content	*VWC*	m³/t of primary product	Eq.9	**3046**

Meat		
10	*PWR[p]*	m³/ton of primary product
3933	*VWC+PWR[p]*	m³/ton primary product
0.78	*pf*	ton of product per ton of primary product
5042	*VWC*	m³/ton of secondary product

Egg yolks		Eggs (not in shell)
5		1
3051		3047
0.50		0.90
6102		3386

Egg yolks dried			Eggs (not in shell) dried
0	*PWR[p]*		0
6102	*VWC+PWR[p]*		3386
0.80	*pf*		0.75
7628	*VWC*		4514

Kind of animal: **Horses**
Farming system: **Grazing**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult horse =   0.40 ton/animal

Water from drinking

	Foal	Mature horse
Age (month)	1	24
Range of daily consumption (l/day/animal)	3	45
Average daily consumption (l/day/animal)	24.00	

Total drinking water required   =   Avgerage daily demand * Age

                   =   17520 litre/animal   =   **17.52 m³/animal**

Water from servicing

	Foal	Mature horse
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required   =   Avgerage daily demand * Age

                   =   1825 litre/animal   =   **1.83 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Adult horse	Average feed volume			
Wheat	0.0004	0.0002	1441	0.3	
Oats	0.0784	0.0392	2328	91.3	
Barley	0.0312	0.0156	1098	17.1	
Other small grains	0.0048	0.0024	897	2.2	
Grain corn	0.0100	0.0050	381	1.9	
Dry peas	0.0008	0.0004	1377	0.6	
Soyabean meal	0.0104	0.0052	1227	6.4	
Canola meal	0.0012	0.0006	1098	0.7	
Mill screen	0.0008	0.0004	1441	0.6	
Total grain	0.1380	0.0690			
Non grain portion	0.0080	0.0040	381	1.5	Grain
Complete grain based ration	0.146	0.0730			122
Pasture	1.81	0.90	445	402.4	
Dry hay	2.11	1.06	494	522.7	
Silage	0.06	0.03	494	14.5	
Other roughages	0.07	0.04	445	16.6	Forage
Total roughages	4.06	2.03			956

     Total water consumption in the form of feed per year   =   1079 m³/year

Total volume of water from feed = Age in years * water per year   =   **2157 m³/animal**

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	2.03	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	1.01	m³/yr
Total quantity (for full life span)	**2.03**	m³/animal

Virtual water content of feed = 2157 + 2.03 = **2159 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{17.52}{0.40} + \frac{1.83}{0.40} + \frac{2159}{0.40}$$

$$= 44 + 5 + 5398$$

$$= \textbf{5447 m}^3\textbf{/ton}$$

Kind of animal: **Beef cattle**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult bovine =   0.545 ton/animal

Water from drinking

	Calve	Adult cow
Age (month)	5	36
Range of daily consumption (l/day/animal)	5	38
Average daily consumption (l/day/animal)	21.50	

Total drinking water required   =   Avgerage daily demand * Age

                           =   23543 litre/animal   =   **23.5 m^3/animal**

Water from servicing

	Calve	Adult cow
Range of daily consumption (l/day/animal)	2	11
Average daily consumption (l/day/animal)	6.50	

Total service water required   =   Avgerage daily demand * Age

                           =   7118 litre/animal   =   **7.12 m^3/animal**

Water from feed

Virtual water content of feed = Direct mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)			SWD (m^3/ton)	Crop water (m^3/yr)		
	Beef cattle	Beef rep heifers <1 yr	Average feed volume				
Wheat	0.015	0.004	0.010	1441	14		
Oats	0.164	0.090	0.127	2328	296		
Barley	0.354	0.043	0.199	1098	218		
Other small grains	0.009	0.003	0.006	897	5		
Grain corn	0.087	0.016	0.052	381	20		
Dry peas	0.009	0.004	0.007	1377	9		
Soyabean meal	0.023	0.002	0.013	1227	15		
Canola meal	0.014	0.008	0.011	1098	12		
Mill screen	0.044	0.011	0.028	1441	40		
Total grain	0.719	0.181	0.450				
Non grain portion	0.017	0.003	0.010	381	4	Grain	
Complete grain based ration	0.74	0.18	0.46				632
Pasture	1.52	0.53	1.02	445	455		
Dry hay	1.02	0.53	0.78	494	384		
Silage	0.64	0.13	0.38	494	189		
Other roughages	0.26	0.10	0.18	445	79	Forage	
Total roughages	3.43	1.284	2.359				1107

Total water consumption in the form of feed per year   =   1739 m^3/year

Total volume of water from feed = Age in years * water per year   =   **5218 m^3/animal**

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	2.36	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	1.18	m³/yr
Total quantity (for full life span)	**3.54**	m³/animal

Virtual water content of feed = 5218 + 3.54 = **5221 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{23.54}{0.545} + \frac{7.12}{0.545} + \frac{5221}{0.545}$$

$$= 43 + 13 + 9580$$

$$= \textbf{9636 m}^3\textbf{/ton}$$

Kind of animal: **Dairy cows**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Water from drinking

	Calves	Heifers	Milking cows
Age (yr)	0-1	1-3	3-10
Range of daily consumption (l/day/animal)	5-23	26-70	70
Average daily consumption (l/day/animal)	14	48	70

Total drinking water required   =   14*365+48*2*365+70*7*365

=   219000 litre/animal   =   **219.0 m³/animal**

Water from servicing

	Calves	Heifers	Milking cows
Age (yr)	0-1	1-3	3-10
Average daily consumption (l/day/animal)		11	22

Total service water required   =   0*365+11*2*365+22*7*365

=   64240 litre/animal   =   **64.2 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)			SWD (m³/ton)	Crop water (m³/yr)		
	Calves < 1yrs	Heifers	Dairy cows		Calves < 1yrs	Heifers	Dairy cows
Wheat	0.023	0.056	0.090	1441	33	81	130
Oats	0.063	0.028	0.020	2328	147	65	47
Barley	0.154	0.480	0.774	1098	169	527	850
Other small grains	0.027	0.039	0.053	897	24	35	48
Grain corn	0.262	0.870	1.419	381	100	331	540
Dry peas		0.002	0.003	1377		3	4
Soyabean meal	0.076	0.169	0.261	1227	93	207	320
Canola meal	0.019	0.059	0.100	1098	21	65	110
Mill screen	0.032	0.127	0.220	1441	46	183	317
Total grain	0.656	1.830	2.940				
Non grain portion	0.025	0.096	0.162	381	10	37	62
Complete grain based ration	0.681	1.926	3.102				
Pasture	0.061	0.32	0.33	445	27	142	145
Dry hay	1.05	1.14	1.03	494	517	564	508
Silage	0.43	2.01	2.97	494	214	995	1469
Other roughages	0.06	0.02		445	27	9	
Total roughages	1.60	3.49	4.33				
Total water consumption in the form of feed per year				=	1427	3244	4549
Total = Calve+ Heifer + Milking cow				=	**39043** m³/animal		

Mixing water for feed preparation

	Calves	Heifers	Milking cows
Total feed volume (ton/yr)	2.28	5.42	7.43
Mixing water required for the feed preparation approximately 50% of the total feed consumed (m³/yr)	1.14	2.71	3.71
Total quantity (for full life span)	**32**	m³/animal	

Virtual water content of feed = $\quad$ 39043 $\quad$ + $\quad$ 32 $\quad$ = $\quad$ **39075 m³/animal**

$VWC_a =$ $\quad$ 219.00 $\quad$ + $\quad$ 64.24 $\quad$ + $\quad$ 39075

$\quad$ = $\quad$ **39359 m³/animal**

$\quad$ = $\quad$ **86693** m³/ton

Distribution of virtual water content of a dairy cow to its products

1. Primary products

1. Raw milk		2. Live animal for meat	
Milk yield	7397 kg/yr	Live weight of an adult cow	0.454 ton
Nos of lactation	7		
Total milk produced	51779 kg/animal		
Product fraction, *pf*	114.05 ton/ton of cow		

Product	Quantity (ton/animal)	Market price (US$/ton)	Value from individual product (US$)	Total value (US$/animal)	Value fraction (*vf*)	Share of each product (m³/animal)	VWC (m³/ton)
Raw milk	51.78	700	36245	37494	0.967	38048	**735**
Meat	0.454	2750	1249		0.033	1311	**2887**

2. Secondary product

Product: Milk powder exceeding 1.5% fat
$\quad$ Process water requirements (*PWR*) $\quad$ 10 $\quad\quad$ m³/ton
$\quad$ Product fraction (*pf*) $\quad\quad\quad\quad\quad$ 0.2 $\quad\quad$ ton/ton of primary products
$\quad$ Virtual water content of product = $\quad$ (virtual water content of primary product + *PWR*) / *pf*
$\quad\quad\quad\quad\quad$ = $\quad$ (730 + 10)/0.20
$\quad\quad\quad\quad\quad$ = $\quad$ **3724** $\quad\quad$ m³/ton

Kind of animal: **Swine**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a \quad = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult swine =   0.118 ton/animal

Water from drinking

	Piglet	Adult
Age (month)	0.5	10
Range of daily consumption (l/day/animal)	1.8	14.0
Average daily consumption (l/day/animal)	7.90	

Total drinking water required   =   Avgerage daily demand * Age

=   2403 litre/animal   =   **2.40 m³/animal**

Water from servicing

	Piglet	Adult
Range of daily consumption (l/day/animal)	5	50
Average daily consumption (l/day/animal)	27.50	

Total service water required   =   Avgerage daily demand * Age

=   8365 litre/animal   =   **8.36 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)			SWD (m³/ton)	Crop water (m³/yr)		
	Pigs	Weaner pigs	Average feed volume				
Wheat	0.069	0.001	0.035	1441	50.4		
Oats	0.039		0.020	2328	45.4		
Barley	0.390	0.003	0.197	1098	215.7		
Other small grains	0.004		0.002	897	1.8		
Grain corn	0.221	0.013	0.117	381	44.5		
Dry peas	0.018		0.009	1377	12.4		
Soyabean meal	0.053	0.005	0.029	1227	35.6		
Canola meal	0.048		0.024	1098	26.3		
Mill screen	0.014		0.007	1441	10.1		
Total grain	0.856	0.022	0.439				
Non grain portion	0.040	0.004	0.022	381	8.4	Grain	
Complete grain based ration	0.896	0.026	0.461				451
Pasture							
Dry hay							
Silage							
Other roughages							
Total roughages							
Total water consumption in the form of feed per year				=	451		
Total volume of water from feed = Age in years * water per year				=	**376** m³/animal		

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	0.46	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.23	m³/yr
Total quantity (for full life span)	**0.19**	m³/animal

Virtual water content of feed =   376   +   0.19   =   **376 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{2.40}{0.12} + \frac{8.36}{0.12} + \frac{376}{0.12}$$

$$= 20 + 71 + 3184$$

$$= \textbf{3276 m}^3\textbf{/ton}$$

Kind of animal: **Sheep**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature sheep   0.053 ton/animal

Water from drinking

	5lbs lamb	Adult
Age (month)	0.2	18
Range of daily consumption (l/day/animal)	0.38	7.57
Average daily consumption (l/day/animal)	3.98	

Total drinking water required   =   Avgerage daily demand * Age

                                =   2176 litre/animal   =   **2.18 m³/animal**

Water from servicing

	5lbs lamb	Adult
Range of daily consumption (l/day/animal)	2	5
Average daily consumption (l/day/animal)	3.50	

Total service water required   =   Avgerage daily demand * Age

                                =   1916 litre/animal   =   **1.92 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

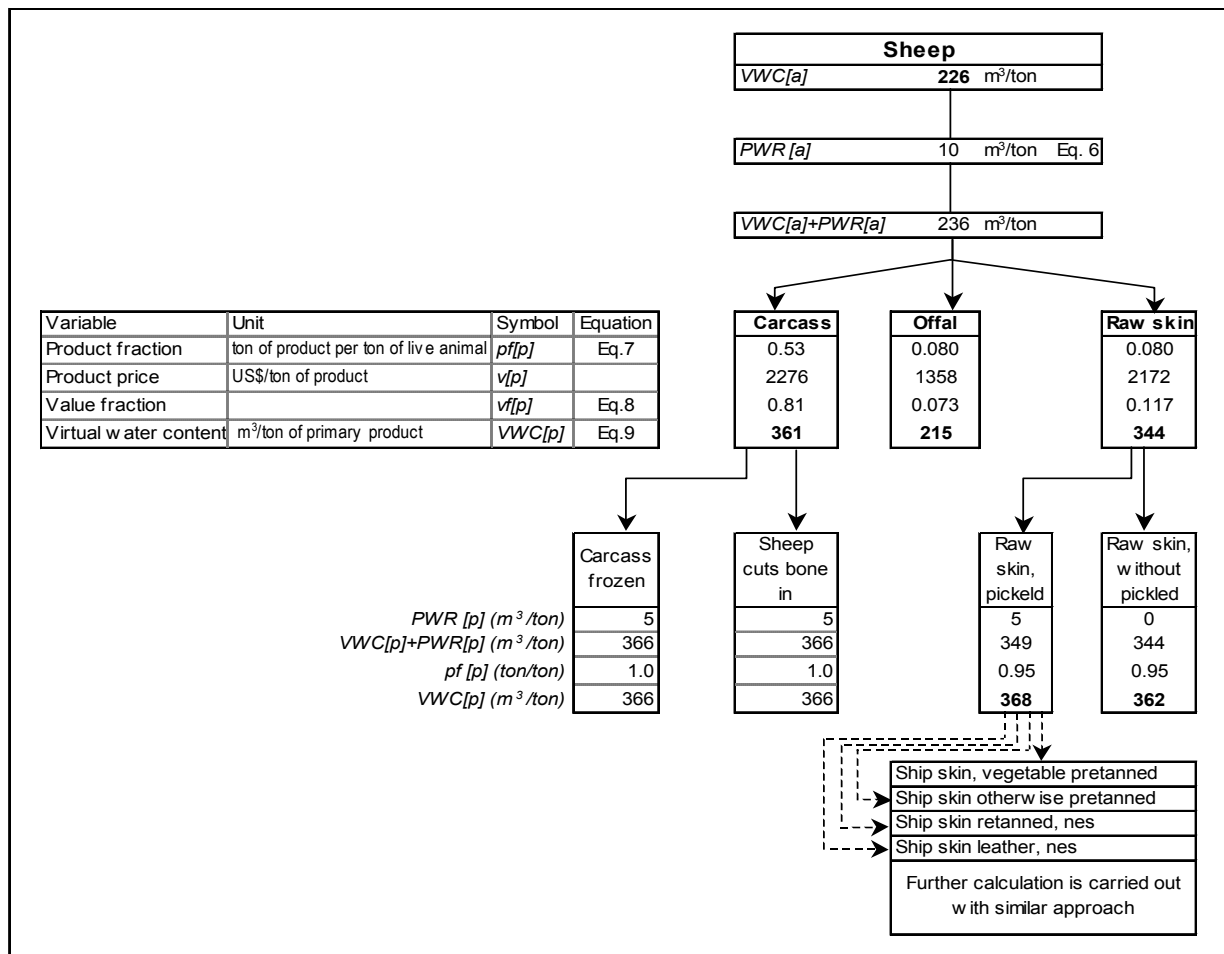| Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)		
	Rams & ewes	Average feed				
Wheat	0.002	0.0010	1441	1.44		
Oats	0.005	0.0025	2328	5.82		
Barley	0.032	0.0160	1098	17.57		
Other small grains	0.001	0.0005	897	0.45		
Grain corn	0.004	0.0020	381	0.76		
Dry peas	0.001	0.0005	1377	0.69		
Soyabean meal	0.002	0.0010	1227	1.23		
Canola meal	0.001	0.0005	1098	0.55		
Mill screen	0.002	0.0010	1441	1.44		
Total grain	0.05	0.0250				
Non grain portion	0.001	0.0005	381	0.19	Grain	
Complete grain based ration	0.051	0.0255				30
Pasture	0.27	0.1325	445	58.96		
Dry hay	0.36	0.1820	494	89.99		
Silage	0.07	0.0350	494	17.31		
Other roughages	0.01	0.0030	445	1.34	Forage	
Total roughages	0.71					168
Total water consumption in the form of feed per year			=	198		
Total volume of water from feed = Age in years * water per year			=	**297** m³/animal		

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	0.03	
Mixing water required for the feed preparation (ton/yr)		
approximately 50% of the total feed consumed	0.01	m³/yr
Total quantity (for full life span)	**0.02**	m³/animal

Virtual water content of feed = 297 + 0.02 = **297 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{2.18}{0.053} + \frac{1.92}{0.053} + \frac{297}{0.053}$$

$$= 41 + 36 + 5596$$

$$= \textbf{5674 m}^3\textbf{/ton}$$

Kind of animal: **Goats**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature sheep   0.04 ton/animal

Water from drinking

	5lbs baby	Adult
Age (month)	0.2	24
Range of daily consumption (l/day/animal)	0.38	3.79
Average daily consumption (l/day/animal)	2.09	

Total drinking water required   =   Avgerage daily demand * Age

                                    =   1522 litre/animal   =   **1.52 m³/animal**

Water from servicing

	5 lbs baby	Adult
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required   =   Avgerage daily demand * Age

                                    =   1825 litre/animal   =   **1.83 m³/animal**

Water from feed

Virtual water content from feed = Mixing water for feed + virtual water from feed crops

Virtual water contents from feed crops:

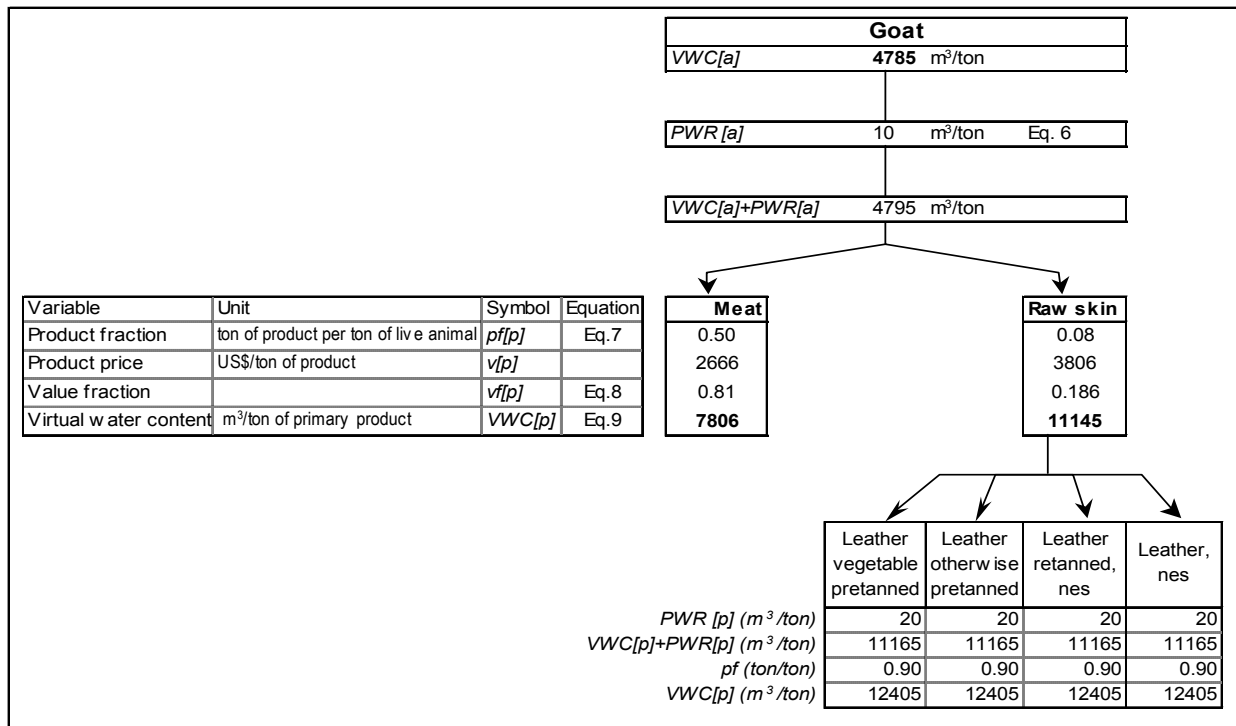| Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Slaughter animal	Average feed volume			
Wheat			1441		
Oats	0.0040	0.0020	2328	4.66	
Barley	0.0130	0.0065	1098	7.14	
Other small grains	0.0010	0.0005	897	0.45	
Grain corn	0.0060	0.0030	381	1.14	
Dry peas			1377		
Soyabean meal	0.0020	0.0010	1227	1.23	
Canola meal	0.0010	0.0005	1098	0.55	
Mill screen			1441		
Total grain	0.0270	0.0135			
Non grain portion	0.0010	0.0005	381	0.19	Grain
Complete grain based ratio	0.0280	0.0140			15
Pasture	0.1040	0.0520	445	23.14	
Dry hay	0.0610	0.0305	494	15.08	
Silage	0.0010	0.0005	494	0.25	
Other roughages					Forage
Total roughages	0.1660				38
Total water consumption in the form of feed per year			=	54	
Total volume of water from feed = Age in years * water per year			=	**108** m³/animal	

Mixing water for feed preparation

	Average	
Total feed volume	0.014	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.007	m³/yr
Total quantity, for full life span	**0.014**	m³/animal

Virtual water content of feed =   108   +   0.014   =   **108 m³/animal**

$$VWC_a \quad = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \quad \frac{1.52}{0.040} \quad + \quad \frac{1.83}{0.040} \quad + \quad \frac{108}{0.040}$$

$$= \quad 38 \quad + \quad 46 \quad + \quad 2691$$

$$= \quad \textbf{2775 m}^3\textbf{/ton}$$

Kind of animal: **Broiler chicken**
Farming system: **Industrial**

Virtual water content of a live bird (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of a mature broiler = 2.20 kg/bird

Water from drinking

	Chick	Adult
Age (weeks)	-	10.00
Range of daily consumption (l/day/bird)	0.02	0.18
Average daily consumption (l/day/bird)	0.28	

Total drinking water required	=	Avgerage daily demand * Age
	=	19.60 litre/bird = **0.0196 m³/bird**

Water from servicing

Total service water required	=	assumed to be 50 percent of drinking requirement = **0.0098 m³/bird**

Water from feed

Virtual water content from feed = Mixing water for feed + virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Adult	Average feed volume			
Wheat	0.0108	0.0054	1441	7.78	
Oats			2328		
Barley			1098		
Other small grains			897		
Grain corn	0.0102	0.0051	381	1.94	
Dry peas			1377		
Soyabean meal	0.0034	0.0017	1227	2.09	
Canola meal	0.0020	0.0010	1098	1.10	
Mill screen	0.0017	0.0009	1441	1.23	
Total grain	0.0281	0.0141			
Non grain portion	0.0065	0.0033	381	1.24	Grain
Complete grain based ration	0.0346	0.0173			15.37
Pasture					
Dry hay					
Silage					
Other roughages					Forage
Total roughages					
Total water consumption in the form of feed per year = 15.37					
Total virtual water of feed per bird (m³/bird) =Total yearly value/52*(age/2) **2.96 m³/bird**					

Mixing water for feed preparation

	Average	
Total feed volume	0.0033	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.0016	m³/yr
Total quantity (for full life span)	**0.002**	m³/bird

Virtual water content of feed = 2.96 + 0.002 = **2.96 m³/bird**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{0.02}{0.0022} + \frac{0.01}{0.0022} + \frac{2.96}{0.0022}$$

$$= 9 + 4 + 1344$$

$$= \mathbf{1358\ m^3/ton}$$

Distribution of virtual water content of broilers to its products

Live weight	=	2.20 kg
Dressed weight	=	1.60 kg
Product fraction, pf	= Dressed weight/live weight
	=	0.73
Value fraction, vf	=	1.00

Virtual water content of broiler meat = *VWCa * vf/pf*

$$= \mathbf{1867\ m^3/ton}$$

Kind of animal: **Laying hens** *Extensive poultry system (High egg producing varieties)*
Farming system: **Industrial**

Virtual water content of a live bird (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Water from drinking

	Chick	Start of laying egg	Adult
Age (weeks)	1	22	75
Range of daily consumption (l/day/bird)	0.02	0.30	0.30
Average daily consumption (l/day/bird)	0.16		0.30

Total drinking water required   =   0.16*22*7+0.30*53*7

              =   136 litre/bird   =   **0.14 m³/bird**

Water from servicing

Total service water required   =   assumed to be 50 percent of drinking requirement   =   **0.07 m³/bird**

Water from feed

Virtual water content from feed = Mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)		
	Laying hens	Average feed volume				
Wheat	0.0108	0.0054	1441	7.8		
Oats			2328			
Barley			1098			
Other small grains			897			
Grain corn	0.0102	0.0051	381	1.9		
Dry peas			1377			
Soyabean meal	0.0034	0.0017	1227	2.1		
Canola meal	0.0020	0.0010	1098	1.1		
Mill screen	0.0017	0.0009	1441	1.2		
Total grain	0.0281	0.0141				
Non grain portion	0.0065	0.0033	381	1.2		Grain
Complete grain based ratio	0.0346	0.0173				15.4
Pasture						
Dry hay						
Silage						
Other roughages						Forage
Total roughages						
Total water consumption in the form of feed per year				15.4		
For growing period	=Total annual value/52*(growing age/			3.3		
For laying period	=Total annual value/52*laying period			15.7		
Total virtual water of feed per bird (m³/bird)				**18.9** m³/bird		

Mixing water for feed preparation

	Average	
Total feed volume	0.007	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.004	m^3/yr
Total quantity (for full life span)	**0.005**	m^3/bird

Virtual water content of feed =   18.92   +   0.005   =   **18.92 m^3/bird**

VWC_a =   0.14   +   0.07   +   18.92

=   **19 m^3/bird**

=   **9563 m^3/ton**

Distribution of virtual water content of layers to its products

Primary products

1. Egg		2. Carcass	
Nos of eggs produced	300 egg/bird	Live weight of bird	0.0020 ton
Weight of an egg	49.61 gram/egg		
Total egg produced	14.88 kg/bird		
Product fraction	7.44 ton/ton of bird		

Product	Quantity (ton/animal)	Market price (US$/ton)	Value from individual product (US$)	Total value (US$/animal)	value fraction (*vf*)	Share of each product (m^3/animal)	VWC (m^3/ton)
Egg	0.0149	1209	18.00	21.11	0.85	16.30	**1095**
Carcass	0.0020	1557	3.11		0.15	2.82	**1411**

Kind of animal: **Horses**
Farming system: **Industrial**

Virtual water content of a live animal (VWC_a)

$$VWC_a = VWC_{drink} + VWC_{serv} + VWC_{feed}$$

$$= \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

Live weight of an adult horse =   0.400 ton/animal

Water from drinking

	Foal	Mature horse
Age (month)	1	24
Range of daily consumption (l/day/animal)	3	45
Average daily consumption (l/day/animal)	24.00	

Total drinking water required   =   Avgerage daily demand * Age

    =   17520 litre/animal   =   **17.5 m³/animal**

Water from servicing

	Foal	Mature horse
Range of daily consumption (l/day/animal)		5
Average daily consumption (l/day/animal)	2.50	

Total service water required   =   Avgerage daily demand * Age

    =   1825 litre/animal   =   **1.83 m³/animal**

Water from feed

Virtual water content of feed = Direct mixing water for feed + Virtual water from feed crops

Virtual water contents from feed crops:

Feed crop	Feed quantity (ton/yr)		SWD (m³/ton)	Crop water (m³/yr)	
	Adult horse	Average feed volume			
Wheat	0.001	0.001	1441	0.7	
Oats	0.196	0.098	2328	228.2	
Barley	0.078	0.039	1098	42.8	
Other small grains	0.012	0.006	897	5.4	
Grain corn	0.025	0.013	381	4.8	
Dry peas	0.002	0.001	1377	1.4	
Soyabean meal	0.026	0.013	1227	16.0	
Canola meal	0.003	0.002	1098	1.6	
Mill screen	0.002	0.001	1441	1.4	
Total grain	0.345	0.173			
Non grain portion	0.020	0.010	381	3.8	Grain
Complete grain based ration	0.37	0.18			306
Pasture	1.51	0.75	445	335.3	
Dry hay	1.76	0.88	494	435.6	
Silage	0.05	0.02	494	12.1	
Other roughages	0.06	0.03	445	13.8	Forage
Total roughages	3.38	1.69			797
Total water consumption in the form of feed per year			=	1103 m³/year	
Total volume of water from feed = Age in years * water per year			=	**2206 m³/animal**	

Mixing water for feed preparation

	Average	
Total feed volume (ton/yr)	1.69	ton/yr
Mixing water required for the feed preparation		
approximately 50% of the total feed consumed	0.85	m³/yr
Total quantity (for full life span)	**1.69**	m³/animal

Virtual water content of feed = 2206 + 1.69 = **2207 m³/animal**

$$VWC_a = \frac{water\ from\ drinking}{W_a} + \frac{water\ from\ servicing}{W_a} + \frac{water\ from\ feed}{W_a}$$

$$= \frac{17.52}{0.400} + \frac{1.83}{0.400} + \frac{2207}{0.400}$$

$$= 44 + 5 + 5519$$

$$= \textbf{5567 m}^3\textbf{/ton}$$

Appendix X.   Virtual water content per kind of live animal by country

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Afghanistan	13685	153181	2794	6515	5518	7510	37558	5646
Albania	13426	141053	6586	6454	5440	5584	27924	5675
Algeria	15142	210204	8671	7400	5056	9625	55060	6130
Andorra	10586	104516	2802	5650	3770	1849	10580	5408
Angola	12891	169020	2245	6081	5365	10243	51222	5614
Anguilla	11781	120172	2245	5645	4776	2392	11969	5390
Antigua Barbuda	11348	160847	4231	5862	4207	4860	27806	5638
Argentina	11549	116565	3471	5943	4052	2327	13315	5782
Armenia	12983	134328	2699	6227	5251	3963	19819	5544
Aruba	10586	104516	2802	5650	3770	1849	10580	5408
Australia	11730	128305	6126	6353	3351	2373	16714	6251
Austria	8025	74922	2307	5369	2494	884	6231	4741
Azerbaijan	13814	146187	13772	6707	5761	4467	22339	5813
Bahamas	13865	173036	6554	7030	4985	4095	23431	5997
Bahrain	10586	104516	2802	5650	3770	1849	10580	5408
Bangladesh	15546	176733	4359	7515	6388	7828	39148	5938
Barbados	11007	135641	3739	5767	4011	3513	20098	5535
Belarus	11821	137472	4536	6251	4241	3601	20601	5442
Belgium-Luxembourg	7670	72447	1833	5203	2431	893	6292	4813
Belize	11254	149419	4415	5902	4213	4448	25447	5766
Benin	12729	163533	5938	6122	5479	8482	42415	5754
Bermuda	13548	143222	3083	6536	5521	4618	23094	5658
Bhutan	11781	120172	2245	5645	4776	2392	11969	5390
Bolivia	14843	159181	3974	7145	5996	7087	35440	5823
Bosnia Herzegovina	11599	123368	2238	5618	4780	2842	14217	5285
British Indian Ocean Territory	11781	120172	2245	5645	4776	2392	11969	5390
British virgin islands	11781	120172	2245	5645	4776	2392	11969	5390
Brazil	13133	134153	5005	6281	4401	3342	19124	6552
Brunei	9391	88861	3359	5655	2763	1305	9192	5427
Bulgaria	11078	130542	4059	5920	4085	3409	19503	5568
Burkina Faso	12899	172552	9265	6181	5622	9366	46838	5793
Burundi	13153	174056	4471	6182	5466	12645	63233	5717
Cambodia	12309	142651	2289	5886	5069	5485	27432	5510
Cameroon	12442	145950	4027	5949	5177	7299	36504	5626
Canada	9636	86693	3276	5674	2775	1358	9563	5567
Cape Verde	14953	427502	10998	6867	6275	19116	109347	6724
Cayman Islands	11781	120172	2245	5645	4776	2392	11969	5390

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Central African Republic	12299	146191	3875	5866	5140	5867	29340	5533
Chad	13973	213531	9055	6563	6034	16651	83263	5915
Chile	10080	102999	2667	5495	3686	1979	11324	5312
China	12596	128124	2522	5948	5076	3111	15560	5671
Christmas Islands	11781	120172	2245	5645	4776	2392	11969	5390
Cocos Islands	11781	120172	2245	5645	4776	2392	11969	5390
Colombia	11782	141520	4035	5972	4187	3878	22188	5835
Comoros	12035	133582	2245	5748	4949	4236	21185	5452
Congo	11781	120172	2245	5645	4776	2392	11969	5390
Congo, D.R.	15810	199384	7254	7656	6700	12181	60912	6178
Cook Islands	11781	120172	2245	5645	4776	2392	11969	5390
Costa Rica	10761	127113	3558	5779	3911	3078	17614	5360
Cote d'Ivoire	12866	170766	9659	6162	5594	9042	45214	5774
Croatia	10717	113808	3361	5807	3870	2667	15262	5250
Cuba	12281	134799	4516	5908	5003	4236	21184	5508
Cyprus	12373	146350	4829	6338	4317	4716	26980	5688
Czech Republic	9901	103298	2609	5514	3668	1716	9823	5088
Denmark	7827	74980	2232	5334	2484	865	6094	4693
Djibouti	12549	160718	2245	5957	5297	7966	39835	5578
Dominica	12819	187520	6915	6492	4737	5617	32135	5893
Dominican Republic	10586	104516	2802	5650	3770	1849	10580	5408
Ecuador	14763	197802	8102	7322	5150	7232	41372	6134
Egypt	15752	127921	4680	6743	4892	2268	12976	8067
El Salvador	12591	141198	4989	6034	4283	4285	24517	6461
Equatorial Guinea	11781	120172	2245	5645	4776	2392	11969	5390
Eritrea	14258	179702	4254	6742	5855	11688	58447	5783
Estonia	12367	124814	4479	6398	4270	3042	17408	5627
Ethiopia	14882	171377	5260	7089	5987	10135	50679	5828
Faeroe Islands	11781	120172	2245	5645	4776	2392	11969	5390
Falkland Islands	11781	120172	2245	5645	4776	2392	11969	5390
Fiji	10586	104516	2802	5650	3770	1849	10580	5408
Finland	9596	106656	4273	5818	2864	1981	13950	5248
France	7744	71255	1936	5257	2424	795	5598	4689
French Guiana	12109	217170	5660	6074	4644	7871	45029	5867
French Polynesia	9391	88861	3359	5655	2763	1305	9192	5427
French Southern Territories	11781	120172	2245	5645	4776	2392	11969	5390
Gabon	10979	132959	3601	5770	4006	3403	19469	5553
Gambia	12640	156777	6141	6046	5315	7165	35834	5624

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Georgia	14123	142993	3031	6357	5535	5476	27388	6324
Germany	7768	74841	2110	5275	2440	877	6182	4672
Ghana	11781	144986	2245	5645	4776	2392	33233	5390
Gibraltar	11781	120172	2245	5645	4776	2392	11969	5390
Greece	12763	128016	5037	6315	4306	3916	22404	6167
Greenland	11781	120172	2245	5645	4776	2392	11969	5390
Grenada	10704	111732	3176	5709	3865	2317	13260	5510
Guadeloupe	11781	120172	2245	5645	4776	2392	11969	5390
Guatemala	14861	165076	7282	7259	5127	3418	19554	6489
Guinea	12273	143664	5274	5865	5132	5432	27164	5541
Guinea Bissau	12600	161009	5181	5998	5353	7822	39114	5620
Guyana	12420	153879	2245	5904	5209	7026	35135	5546
Haiti	12889	173634	4732	6126	5507	9578	47894	5678
Honduras	12534	144008	4099	5936	5052	7250	36256	5516
Hong Kong	9391	88861	3359	5655	2763	1305	9192	5427
Hungary	10298	104621	2776	5623	3740	1771	10137	5207
Iceland	9391	88861	3359	5655	2763	1305	9192	5427
India	14379	161027	7562	6629	5734	8499	42502	6251
Indonesia	13383	145624	4589	6053	5225	8676	43387	5969
Iran	15783	186394	9133	7881	5518	5203	29769	6321
Iraq	15776	233540	16607	7653	5488	11585	66274	6572
Ireland	7586	75150	2017	5251	2455	908	6395	4664
Israel	15500	177822	7734	7755	5343	5434	31090	6241
Italy	9595	88606	3465	5716	2756	1637	11529	5436
Jamaica	12324	182982	4859	6037	4479	6020	34439	6147
Japan	9535	115754	4082	5658	2913	2044	14392	5549
Jordan	14478	178095	8682	6985	4400	12876	73657	5844
Kazakhstan	18959	170581	6302	7233	5416	6837	39113	9661
Kenya	12789	152080	5156	6086	5291	8122	40618	5640
Kiribati	11781	120172	2245	5645	4776	2392	11969	5390
Kuwait	9391	88861	3359	5655	2763	1305	9192	5427
Kyrgyzstan	12834	145400	15588	6190	5418	6061	30314	5754
Laos	12133	136978	2742	5827	5048	4883	24422	5539
Latvia	11741	125614	4257	6173	4208	2773	15865	5634
Lebanon	11106	120977	4448	5911	4189	3908	16451	5854
Liberia	11106	136237	4448	5911	4189	3908	22362	5854
Libya	15167	170224	6239	7276	6168	8601	43010	5880
Lithuania	12398	128027	2831	5995	5069	3249	16249	5492

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Macau	10586	104516	2802	5650	3770	1849	10580	5408
Macedonia	10963	114379	3620	5805	3946	2190	12532	5498
Madagascar	12989	174050	8238	6199	5599	10110	50559	5775
Malawi	12539	145274	4833	5955	5121	7785	38933	5584
Malaysia	12934	173515	5913	6521	4498	7468	42722	5882
Maldives	10586	104516	2802	5650	3770	1849	10580	5408
Mali	12700	153177	5889	6028	5218	8087	40443	5592
Malta	10264	104316	2761	5610	3719	1849	10580	5204
Marshall Islands	10586	104516	2802	5650	3770	1849	10580	5408
Martinique	11781	120172	2245	5645	4776	2392	11969	5390
Mauritania	19223	298716	15006	9063	8275	27332	136668	6693
Mauritius	10639	108469	2902	5665	3801	2060	11789	5425
Mexico	12493	129072	4062	6080	4265	2806	16058	6375
Micronesia	10586	104516	2802	5650	3770	1849	10580	5408
Moldova	12698	136843	2881	6103	5201	4545	22730	5566
Mongolia	12977	145966	2245	5941	4878	12923	64621	5455
Montserrat	12325	148896	2245	5866	5145	6341	31710	5523
Morocco	15876	329903	12428	7531	6051	14457	82701	6693
Mozambique	12264	137178	4069	5818	4984	5928	29644	5484
Myanmar	13781	159800	4888	6601	5658	8208	41046	5750
N. Caledonia	10586	104516	2802	5650	3770	1849	10580	5408
N. Mariana	11781	120172	2245	5645	4776	2392	11969	5390
Nauru	11781	120172	2245	5645	4776	2392	11969	5390
Nepal	14007	160080	3724	6747	5747	8422	42115	5821
Netherlands Antilles	11781	120172	2245	5645	4776	2392	11969	5390
Netherlands	7676	76186	2084	5259	2451	914	6440	4658
New Zealand	10551	150251	3764	5649	4045	4179	23907	5445
Nicaragua	13496	159491	3743	6167	5483	7713	38573	6072
Niger	15594	201164	22346	7601	6796	12703	63521	6356
Nigeria	13193	178880	8250	6313	5710	12563	62820	5917
Niue	11781	120172	2245	5645	4776	2392	11969	5390
Norfolk Islands	11781	120172	2245	5645	4776	2392	11969	5390
North Korea	11884	123971	4649	5961	4153	2860	16367	6125
Norway	9439	84625	3382	5690	2764	1054	7423	5434
Oman	17777	195041	9229	8066	5838	5427	31046	7764
Pakistan	14610	162227	10618	7100	5978	7853	39271	5942
Palau	10586	104516	2802	5650	3770	1849	10580	5408
Panama	11934	177898	5773	6121	4413	6865	39271	5915

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Papua New Guinea	11834	123064	2151	5666	4812	2796	13986	5402
Paraguay	13302	155287	6648	6570	4640	4443	25420	6253
Peru	14179	170450	6301	6921	4890	5275	30177	6379
Philippines	12203	140341	4119	5847	5074	5288	26447	5534
Pitcairn	11781	120172	2245	5645	4776	2392	11969	5390
Poland	10164	106481	2560	5566	3725	2003	11461	5211
Portugal	15177	139203	5279	6800	4739	4029	23052	7318
Qatar	10893	108035	3096	5776	3845	2172	12428	5446
Reunion	10980	116362	3369	5808	3859	2465	14105	5486
Romania	11198	118498	3681	5854	3993	2527	14462	5600
Russia	13089	156167	6010	6510	4600	4702	26900	6205
Rwanda	11781	120172	2245	5645	4776	2392	11969	5390
Saint Vincent- Grenadines	11781	120172	2245	5645	4776	2392	11969	5390
Samoa	10586	104516	2802	5650	3770	1849	10580	5408
Sao Tome Principe	11781	120172	2245	5645	4776	2392	11969	5390
Saudi Arabia	11359	148223	4985	5904	4179	4146	23718	5648
Senegal	12535	155393	5368	5982	5284	7033	35170	5600
Seychelles	10586	104516	2802	5650	3770	1849	10580	5408
Sierra Leone	12306	145849	4757	5875	5151	5764	28828	5544
Singapore	11261	135065	6162	6351	3317	3107	21878	5879
Slovakia	10513	115346	3427	5715	3878	2323	13295	5333
Slovenia	10625	107387	2875	5661	3792	2002	11458	5420
Solomon Islands	11781	120172	2245	5645	4776	2392	11969	5390
Somalia	11781	120172	2245	5645	4776	2392	11969	5390
South Africa	16095	184259	8799	7476	5440	5035	28806	7248
South Korea	10586	104516	2802	5650	3770	1849	10580	5408
Spain	11963	108762	3057	5935	4042	1912	10944	6114
Spec Cats	11781	120172	2245	5645	4776	2392	11969	5390
Sri Lanka	12736	157706	7283	6134	5390	7414	37075	5707
Saint Helena	11781	120172	2245	5645	4776	2392	11969	5390
Saint Kitts Nevis	10586	104516	2802	5650	3770	1849	10580	5408
Saint Lucia	10586	104516	2802	5650	3770	1849	10580	5408
St. Pier. Miquelon	11781	120172	2245	5645	4776	2392	11969	5390
Sudan	13265	187055	6548	6248	5689	13072	65367	5783
Suriname	11842	192380	5653	6087	4581	6819	39010	6003
Sweden	8339	79869	2645	5463	2597	929	6546	4886
Switzerland Liechtenstein	8778	73645	2383	5425	2574	858	6045	5288
Syria	20992	218786	12197	10379	8612	9820	49105	6789

	Virtual water content of live animal (m³/ton)							
	Beef cattle	Dairy cows	Swine	Sheep	Goats	Fowls/ Poultry	Laying hens	Horses
Taiwan	10586	104516	2802	5650	3770	1849	10580	5408
Tajikistan	13135	146931	8002	6244	5329	7575	37880	5641
Tanzania	13260	172358	6647	6398	5729	11305	56532	5948
Thailand	14668	158942	6452	7039	4836	5763	32971	6505
Togo	12805	145719	6027	6081	5092	7986	39934	5567
Tokelau	11781	120172	2245	5645	4776	2392	11969	5390
Tonga	10586	104516	2775	5650	3770	1849	10580	5408
Trinidad Tobago	11082	140429	3967	5825	4107	3788	21672	5655
Tunisia	40101	166105	13205	10331	9054	3435	19656	22722
Turkey	11070	108725	3242	5624	3828	2301	13165	5821
Turkmenistan	19703	199931	5445	9705	7990	6471	32363	6439
Turks Caicos Islands	11781	120172	2245	5645	4776	2392	11969	5390
Tuvalu	11781	120172	2245	5645	4776	2392	11969	5390
Uganda	12645	155131	3687	6026	5260	8198	40994	5625
Ukraine	13070	146022	4682	6209	5380	6160	30809	5749
United Arab Emirates	12476	190587	8472	6541	3007	9026	63547	5791
United Kingdom	7759	74704	2106	5309	2476	784	5524	4659
Uruguay	13684	123330	4277	6294	4410	2814	16102	7024
US miscellaneous pacific	10586	104516	2802	5650	3770	1849	10580	5408
USA	10063	86879	3374	5718	2843	1304	9183	5874
Uzbekistan	13471	145482	4010	6527	5570	4851	24261	5715
Vanuatu	11781	120172	2245	5645	4776	2392	11969	5390
Venezuela	14615	176025	6616	6912	4699	9072	51896	6490
Viet Nam	13948	150587	3226	6754	5718	4947	24744	5729
Wallis Fortuna Islands	11781	120172	2245	5645	4776	2392	11969	5390
Yemen	13873	164444	4140	6616	5707	8435	42179	5721
Yugoslavia	11443	123989	3682	5949	4042	3016	17255	5618
Zambia	14766	169865	6104	7164	6188	6340	31709	5888
Zimbabwe	13119	148146	5733	6335	5486	4939	24702	5671

Note: The reasons for matching virtual water content of live animals for few countries are: first the climate data used for the crop water requirements are same for these countries and second these countries have similar farming system.

Appendix XI. Virtual water content per type of livestock product by country (m³/ton)

For explanation of product codes the reader is referred to Appendix II.

Product codes	010111	010119	010120	010210	010290	010310	010391	010392	010410	010420	010511	010519	010599	010600	020110	020120
Afghanistan	5646	5646	5646	13685	13685	2794	2794	2794	6515	5518	7510	7510	7510	13685	22849	22849
Albania	5675	5675	5675	13426	13426	6586	6586	6586	6454	5440	5584	5584	5584	13426	22418	22418
Algeria	6130	6130	6130	15142	15142	8671	8671	8671	7400	5056	9625	9625	9625	15142	25279	25279
Andorra	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Angola	5614	5614	5614	12891	12891	2245	2245	2245	6081	5365	10243	10243	10243	12891	21524	21524
Anguilla	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Antigua Barbuda	5638	5638	5638	11348	11348	4231	4231	4231	5862	4207	4860	4860	4860	11348	18949	18949
Argentina	5782	5782	5782	11549	11549	3471	3471	3471	5943	4052	2327	2327	2327	11549	19285	19285
Armenia	5544	5544	5544	12983	12983	2699	2699	2699	6227	5251	3963	3963	3963	12983	21679	21679
Aruba	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Australia	6251	6251	6251	11730	11730	6126	6126	6126	6353	3351	2373	2373	2373	11730	19587	19587
Austria	4741	4741	4741	8025	8025	2307	2307	2307	5369	2494	884	884	884	8025	13405	13405
Azerbaijan	5813	5813	5813	13814	13814	13772	13772	13772	6707	5761	4467	4467	4467	13814	23065	23065
Bahamas	5997	5997	5997	13865	13865	6554	6554	6554	7030	4985	4095	4095	4095	13865	23149	23149
Bahrain	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Bangladesh	5938	5938	5938	15546	15546	4359	4359	4359	7515	6388	7828	7828	7828	15546	25954	25954
Barbados	5535	5535	5535	11007	11007	3739	3739	3739	5767	4011	3513	3513	3513	11007	18381	18381
Belarus	5442	5442	5442	11821	11821	4536	4536	4536	6251	4241	3601	3601	3601	11821	19739	19739
Belgium-Luxembourg	4813	4813	4813	7670	7670	1833	1833	1833	5203	2431	893	893	893	7670	12813	12813
Belize	5766	5766	5766	11254	11254	4415	4415	4415	5902	4213	4448	4448	4448	11254	18794	18794
Benin	5754	5754	5754	12729	12729	5938	5938	5938	6122	5479	8482	8482	8482	12729	21254	21254
Bermuda	5658	5658	5658	13548	13548	3083	3083	3083	6536	5521	4618	4618	4618	13548	22621	22621
Bhutan	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Bolivia	5823	5823	5823	14843	14843	3974	3974	3974	7145	5996	7087	7087	7087	14843	24780	24780
Bosnia Herzegovina	5285	5285	5285	11599	11599	2238	2238	2238	5618	4780	2842	2842	2842	11599	19369	19369
British indian ocean territory	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
British virgin islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Brazil	6552	6552	6552	13133	13133	5005	5005	5005	6281	4401	3342	3342	3342	13133	21929	21929
Brunei	5427	5427	5427	9391	9391	3359	3359	3359	5655	2763	1305	1305	1305	9391	15685	15685
Bulgaria	5568	5568	5568	11078	11078	4059	4059	4059	5920	4085	3409	3409	3409	11078	18500	18500
Burkina Faso	5793	5793	5793	12899	12899	9265	9265	9265	6181	5622	9366	9366	9366	12899	21537	21537
Burundi	5717	5717	5717	13153	13153	4471	4471	4471	6182	5466	12645	12645	12645	13153	21962	21962
Cambodia	5510	5510	5510	12309	12309	2289	2289	2289	5886	5069	5485	5485	5485	12309	20553	20553
Cameroon	5626	5626	5626	12442	12442	4027	4027	4027	5949	5177	7299	7299	7299	12442	20776	20776
Canada	5567	5567	5567	9636	9636	3276	3276	3276	5674	2775	1358	1358	1358	9636	16094	16094
Cape Verde	6724	6724	6724	14953	14953	10998	10998	10998	6867	6275	19116	19116	19116	14953	24965	24965
Cayman Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Centtral African Republic	5533	5533	5533	12299	12299	3875	3875	3875	5866	5140	5867	5867	5867	12299	20537	20537
Chad	5915	5915	5915	13973	13973	9055	9055	9055	6563	6034	16651	16651	16651	13973	23330	23330
Chile	5312	5312	5312	10080	10080	2667	2667	2667	5495	3686	1979	1979	1979	10080	16834	16834
China	5671	5671	5671	12596	12596	2522	2522	2522	5948	5076	3111	3111	3111	12596	21032	21032
Christmas Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Cocos Islnds	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Colombia	5835	5835	5835	11782	11782	4035	4035	4035	5972	4187	3878	3878	3878	11782	19673	19673
Comoros	5452	5452	5452	12035	12035	2245	2245	2245	5748	4949	4236	4236	4236	12035	20096	20096
Congo	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Congo, D.R.	6178	6178	6178	15810	15810	7254	7254	7254	7656	6700	12181	12181	12181	15810	26394	26394
Cook Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Costa Rica	5360	5360	5360	10761	10761	3558	3558	3558	5779	3911	3078	3078	3078	10761	17971	17971
Cote d'Ivoire	5774	5774	5774	12866	12866	9659	9659	9659	6162	5594	9042	9042	9042	12866	21483	21483
Croatia	5250	5250	5250	10717	10717	3361	3361	3361	5807	3870	2667	2667	2667	10717	17896	17896
Cuba	5508	5508	5508	12281	12281	4516	4516	4516	5908	5003	4236	4236	4236	12281	20507	20507
Cyprus	5688	5688	5688	12373	12373	4829	4829	4829	6338	4317	4716	4716	4716	12373	20659	20659
Czech Republic	5088	5088	5088	9901	9901	2609	2609	2609	5514	3668	1716	1716	1716	9901	16535	16535
Denmark	4693	4693	4693	7827	7827	2232	2232	2232	5334	2484	865	865	865	7827	13076	13076
Djibouti	5578	5578	5578	12549	12549	2245	2245	2245	5957	5297	7966	7966	7966	12549	20954	20954
Dominica	5893	5893	5893	12819	12819	6915	6915	6915	6492	4737	5617	5617	5617	12819	21405	21405
Dominican Republic	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Ecuador	6134	6134	6134	14763	14763	8102	8102	8102	7322	5150	7232	7232	7232	14763	24648	24648
Egypt	8067	8067	8067	15752	15752	4680	4680	4680	6743	4892	2268	2268	2268	15752	26298	26298
El Salvador	6461	6461	6461	12591	12591	4989	4989	4989	6034	4283	4285	4285	4285	12591	21024	21024
EquatorialGuinea	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Eritrea	5783	5783	5783	14258	14258	4254	4254	4254	6742	5855	11688	11688	11688	14258	23804	23804
Estonia	5627	5627	5627	12367	12367	4479	4479	4479	6398	4270	3042	3042	3042	12367	20651	20651
Ethiopia	5828	5828	5828	14882	14882	5260	5260	5260	7089	5987	10135	10135	10135	14882	24847	24847
Faeroe Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Falkland Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Fiji	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Finland	5248	5248	5248	9596	9596	4273	4273	4273	5818	2864	1981	1981	1981	9596	16026	16026
France	4689	4689	4689	7744	7744	1936	1936	1936	5257	2424	795	795	795	7744	12936	12936
French Guiana	5867	5867	5867	12109	12109	5660	5660	5660	6074	4644	7871	7871	7871	12109	20220	20220

Product codes	010111	010119	010120	010210	010290	010310	010391	010392	010410	010420	010511	010519	010599	010600	020110	020120
French Polynesia	5427	5427	5427	9391	9391	3359	3359	3359	5655	2763	1305	1305	1305	9391	15685	15685
French Southern Ant. Teritory	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Gabon	5553	5553	5553	10979	10979	3601	3601	3601	5770	4006	3403	3403	3403	10979	18334	18334
Gambia	5624	5624	5624	12640	12640	6141	6141	6141	6046	5315	7165	7165	7165	12640	21106	21106
Georgia	6324	6324	6324	14123	14123	3031	3031	3031	6357	5535	5476	5476	5476	14123	23580	23580
Germany	4672	4672	4672	7768	7768	2110	2110	2110	5275	2440	877	877	877	7768	12976	12976
Ghana	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Gibraltar	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	5950	5950
Greece	6167	6167	6167	12763	12763	5037	5037	5037	6315	4306	3916	3916	3916	12763	21310	21310
Greenland	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Grenada	5510	5510	5510	10704	10704	3176	3176	3176	5709	3865	2317	2317	2317	10704	17876	17876
Guadeloupe	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Guatemala	6489	6489	6489	14861	14861	7282	7282	7282	7259	5127	3418	3418	3418	14861	24811	24811
Guinea	5541	5541	5541	12273	12273	5274	5274	5274	5865	5132	5432	5432	5432	12273	20493	20493
Guineabissau	5620	5620	5620	12600	12600	5181	5181	5181	5998	5353	7822	7822	7822	12600	21039	21039
Guyana	5546	5546	5546	12420	12420	2245	2245	2245	5904	5209	7026	7026	7026	12420	20738	20738
Haiti	5678	5678	5678	12889	12889	4732	4732	4732	6126	5507	9578	9578	9578	12889	21521	21521
Honduras	5516	5516	5516	12534	12534	4099	4099	4099	5936	5052	7250	7250	7250	12534	20929	20929
Hong Kong	5427	5427	5427	9391	9391	3359	3359	3359	5655	2763	1305	1305	1305	9391	15685	15685
Hungary	5207	5207	5207	10298	10298	2776	2776	2776	5623	3740	1771	1771	1771	10298	17199	17199
Iceland	5427	5427	5427	9391	9391	3359	3359	3359	5655	2763	1305	1305	1305	9391	15685	15685
India	6251	6251	6251	14379	14379	7562	7562	7562	6629	5734	8499	8499	8499	14379	24006	24006
Indonesia	5969	5969	5969	13383	13383	4589	4589	4589	6053	5225	8676	8676	8676	13383	22346	22346
Iran	6321	6321	6321	15783	15783	9133	9133	9133	7881	5518	5203	5203	5203	15783	26349	26349
Iraq	6572	6572	6572	15776	15776	16607	16607	16607	7653	5488	11585	11585	11585	15776	26338	26338
Ireland	4664	4664	4664	7586	7586	2017	2017	2017	5251	2455	908	908	908	7586	12674	12674
Israel	6241	6241	6241	15500	15500	7734	7734	7734	7755	5343	5434	5434	5434	15500	25878	25878
Italy	5436	5436	5436	9595	9595	3465	3465	3465	5716	2756	1637	1637	1637	9595	16025	16025
Jamaica	6147	6147	6147	12324	12324	4859	4859	4859	6037	4479	6020	6020	6020	12324	20579	20579
Japan	5549	5549	5549	9535	9535	4082	4082	4082	5658	2913	2044	2044	2044	9535	15924	15924
Jordan	5844	5844	5844	14478	14478	8682	8682	8682	6985	4400	12876	12876	12876	14478	24171	24171
Kazakstan	9661	9661	9661	18959	18959	6302	6302	6302	7233	5416	6837	6837	6837	18959	31648	31648
Kenya	5640	5640	5640	12789	12789	5156	5156	5156	6086	5291	8122	8122	8122	12789	21353	21353
Kiribati	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
North Korea	6125	6125	6125	11884	11884	4649	4649	4649	5961	4153	2860	2860	2860	11884	19845	19845
South Korea	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Kuwait	5427	5427	5427	9391	9391	3359	3359	3359	5655	2763	1305	1305	1305	9391	15685	15685
Kyrgyzstan	5754	5754	5754	12834	12834	15588	15588	15588	6190	5418	6061	6061	6061	12834	21429	21429
Laos	5539	5539	5539	12133	12133	2742	2742	2742	5827	5048	4883	4883	4883	12133	20260	20260
Latvia	5634	5634	5634	11741	11741	4257	4257	4257	6173	4208	2773	2773	2773	11741	19605	19605
Lebanon	5854	5854	5854	11106	11106	4448	4448	4448	5911	4189	3908	3908	3908	11106	18546	18546
Liberia	5854	5854	5854	11106	11106	4448	4448	4448	5911	4189	3908	3908	3908	11106	5609	5609
Libya	5880	5880	5880	15167	15167	6239	6239	6239	7276	6168	8601	8601	8601	15167	25322	25322
Lithuania	5492	5492	5492	12398	12398	2831	2831	2831	5995	5069	3249	3249	3249	12398	20702	20702
Macau	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Macedonia	5498	5498	5498	10963	10963	3620	3620	3620	5805	3946	2190	2190	2190	10963	18307	18307
Madagascar	5775	5775	5775	12989	12989	8238	8238	8238	6199	5599	10110	10110	10110	12989	21688	21688
Malawi	5584	5584	5584	12539	12539	4833	4833	4833	5955	5121	7785	7785	7785	12539	20938	20938
Malaysia	5882	5882	5882	12934	12934	5913	5913	5913	6521	4498	7468	7468	7468	12934	21596	21596
Maldives	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Mali	5592	5592	5592	12700	12700	5889	5889	5889	6028	5218	8087	8087	8087	12700	21205	21205
Malta	5204	5204	5204	10264	10264	2761	2761	2761	5610	3719	1849	1849	1849	10264	17141	17141
Marshall Islands	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Martinique	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Mauritania	6693	6693	6693	19223	19223	15006	15006	15006	9063	8275	27332	27332	27332	19223	32088	32088
Mauritius	5425	5425	5425	10639	10639	2902	2902	2902	5665	3801	2060	2060	2060	10639	17768	17768
Mexico	6375	6375	6375	12493	12493	4062	4062	4062	6080	4265	2806	2806	2806	12493	20860	20860
Micronesia	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Moldova	5566	5566	5566	12698	12698	2881	2881	2881	6103	5201	4545	4545	4545	12698	21203	21203
Mongolia	5455	5455	5455	12977	12977	2245	2245	2245	5941	4878	12923	12923	12923	12977	21668	21668
Montserrat	5523	5523	5523	12325	12325	2245	2245	2245	5866	5145	6341	6341	6341	12325	20581	20581
Morocco	6693	6693	6693	15876	15876	12428	12428	12428	7531	6051	14457	14457	14457	15876	26505	26505
Mozambique	5484	5484	5484	12264	12264	4069	4069	4069	5818	4984	5928	5928	5928	12264	20478	20478
Myanmar	5750	5750	5750	13781	13781	4888	4888	4888	6601	5658	8208	8208	8208	13781	23010	23010
N.Caledonia	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
N.Mariana	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Nauru	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Nepal	5821	5821	5821	14007	14007	3724	3724	3724	6747	5747	8422	8422	8422	14007	23386	23386
Netherlands Antilles	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Netherlands	4658	4658	4658	7676	7676	2084	2084	2084	5259	2451	914	914	914	7676	12824	12824
New Zealand	5445	5445	5445	10551	10551	3764	3764	3764	5649	4045	4179	4179	4179	10551	17620	17620
Nicaragua	6072	6072	6072	13496	13496	3743	3743	3743	6167	5483	7713	7713	7713	13496	22533	22533
Niger	6356	6356	6356	15594	15594	22346	22346	22346	7601	6796	12703	12703	12703	15594	26034	26034
Nigeria	5917	5917	5917	13193	13193	8250	8250	8250	6313	5710	12563	12563	12563	13193	22029	22029

Product codes	010111	010119	010120	010210	010290	010310	010391	010392	010410	010420	010511	010519	010599	010600	020110	020120
Niue	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Norfolk Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Norway	5434	5434	5434	9439	9439	3382	3382	3382	5690	2764	1054	1054	1054	9439	15765	15765
Oman	7764	7764	7764	17777	17777	9229	9229	9229	8066	5838	5427	5427	5427	17777	29676	29676
Pakistan	5942	5942	5942	14610	14610	10618	10618	10618	7100	5978	7853	7853	7853	14610	24393	24393
Palau	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Panama	5915	5915	5915	11934	11934	5773	5773	5773	6121	4413	6865	6865	6865	11934	19927	19927
Papua New Guinea	5402	5402	5402	11834	11834	2151	2151	2151	5666	4812	2796	2796	2796	11834	19761	19761
Paraguay	6253	6253	6253	13302	13302	6648	6648	6648	6570	4640	4443	4443	4443	13302	22210	22210
Peru	6379	6379	6379	14179	14179	6301	6301	6301	6921	4890	5275	5275	5275	14179	23673	23673
Philippines	5534	5534	5534	12203	12203	4119	4119	4119	5847	5074	5288	5288	5288	12203	20377	20377
Pitcairn	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Poland	5211	5211	5211	10164	10164	2560	2560	2560	5566	3725	2003	2003	2003	10164	16974	16974
Portugal	7318	7318	7318	15177	15177	5279	5279	5279	6800	4739	4029	4029	4029	15177	25338	25338
Qatar	5446	5446	5446	10893	10893	3096	3096	3096	5776	3845	2172	2172	2172	10893	18191	18191
Reunion	5486	5486	5486	10980	10980	3369	3369	3369	5808	3859	2465	2465	2465	10980	18337	18337
Romania	5600	5600	5600	11198	11198	3681	3681	3681	5854	3993	2527	2527	2527	11198	18699	18699
Russia	6205	6205	6205	13089	13089	6010	6010	6010	6510	4600	4702	4702	4702	13089	21855	21855
Rwanda	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
South Africa	7248	7248	7248	16095	16095	8799	8799	8799	7476	5440	5035	5035	5035	16095	26869	26869
St.Vincent-Grenadine	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Samoa	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Sao Tome Prncipe	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Saudi Arabia	5648	5648	5648	11359	11359	4985	4985	4985	5904	4179	4146	4146	4146	11359	18968	18968
Senegal	5600	5600	5600	12535	12535	5368	5368	5368	5982	5284	7033	7033	7033	12535	20930	20930
Seychelles	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Sierra Leone	5544	5544	5544	12306	12306	4757	4757	4757	5875	5151	5764	5764	5764	12306	20549	20549
Singapore	5879	5879	5879	11261	11261	6162	6162	6162	6351	3317	3107	3107	3107	11261	18805	18805
Slovakia	5333	5333	5333	10513	10513	3427	3427	3427	5715	3878	2323	2323	2323	10513	17557	17557
Slovenia	5420	5420	5420	10625	10625	2875	2875	2875	5661	3792	2002	2002	2002	10625	17743	17743
Solomon Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Somalia	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Spain	6114	6114	6114	11963	11963	3057	3057	3057	5935	4042	1912	1912	1912	11963	19977	19977
Spec Cats	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Sri Lanka	5707	5707	5707	12736	12736	7283	7283	7283	6134	5390	7414	7414	7414	12736	21265	21265
St. Helena	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
St. Kitts Nev	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
St. Lucia	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
St. Pier. Miqu	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Sudan	5783	5783	5783	13265	13265	6548	6548	6548	6248	5689	13072	13072	13072	13265	22148	22148
Suriname	6003	6003	6003	11842	11842	5653	5653	5653	6087	4581	6819	6819	6819	11842	19775	19775
Sweden	4886	4886	4886	8339	8339	2645	2645	2645	5463	2597	929	929	929	8339	13930	13930
Switzerland-Liechnstine	5288	5288	5288	8778	8778	2383	2383	2383	5425	2574	858	858	858	8778	14662	14662
Syria	6789	6789	6789	20992	20992	12197	12197	12197	10379	8612	9820	9820	9820	20992	35040	35040
Taiwan	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
Tajikistan	5641	5641	5641	13135	13135	8002	8002	8002	6244	5329	7575	7575	7575	13135	21932	21932
Tanzania	5948	5948	5948	13260	13260	6647	6647	6647	6398	5729	11305	11305	11305	13260	22140	22140
Thailand	6505	6505	6505	14668	14668	6452	6452	6452	7039	4836	5763	5763	5763	14668	24489	24489
Togo	5567	5567	5567	12805	12805	6027	6027	6027	6081	5092	7986	7986	7986	12805	21380	21380
Tokelau	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Tonga	5408	5408	5408	10586	10586	2775	2775	2775	5650	3770	1849	1849	1849	10586	17679	17679
Trinidad Tobago	5655	5655	5655	11082	11082	3967	3967	3967	5825	4107	3788	3788	3788	11082	18507	18507
Tunisia	22722	22722	22722	40101	40101	13205	13205	13205	10331	9054	3435	3435	3435	40101	66922	66922
Turkey	5821	5821	5821	11070	11070	3242	3242	3242	5624	3828	2301	2301	2301	11070	18486	18486
Turkmenistan	6439	6439	6439	19703	19703	5445	5445	5445	9705	7990	6471	6471	6471	19703	32890	32890
Turks Caicos Island	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Tuvalu	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Uganda	5625	5625	5625	12645	12645	3687	3687	3687	6026	5260	8198	8198	8198	12645	21113	21113
Ukraine	5749	5749	5749	13070	13070	4682	4682	4682	6209	5380	6160	6160	6160	13070	21822	21822
United Arab Emirates	5791	5791	5791	12476	12476	8472	8472	8472	6541	3007	9026	9026	9026	12476	20831	20831
United Kingdom	4659	4659	4659	7759	7759	2106	2106	2106	5309	2476	784	784	784	7759	12962	12962
Uruguay	7024	7024	7024	13684	13684	4277	4277	4277	6294	4410	2814	2814	2814	13684	22848	22848
US Msc.Pacific	5408	5408	5408	10586	10586	2802	2802	2802	5650	3770	1849	1849	1849	10586	17679	17679
USA	5874	5874	5874	10063	10063	3374	3374	3374	5718	2843	1304	1304	1304	10063	16806	16806
Uzbekistan	5715	5715	5715	13471	13471	4010	4010	4010	6527	5570	4851	4851	4851	13471	22491	22491
Vanuatu	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Venezuela	6490	6490	6490	14615	14615	6616	6616	6616	6912	4699	9072	9072	9072	14615	24401	24401
Viet Nam	5729	5729	5729	13948	13948	3226	3226	3226	6754	5718	4947	4947	4947	13948	23287	23287
Wallis Futuna Islands	5390	5390	5390	11781	11781	2245	2245	2245	5645	4776	2392	2392	2392	11781	19672	19672
Yemen	5721	5721	5721	13873	13873	4140	4140	4140	6616	5707	8435	8435	8435	13873	23163	23163
Yugoslavia	5618	5618	5618	11443	11443	3682	3682	3682	5949	4042	3016	3016	3016	11443	19108	19108
Zambia	5888	5888	5888	14766	14766	6104	6104	6104	7164	6188	6340	6340	6340	14766	24653	24653
Zimbabe	5671	5671	5671	13119	13119	5733	5733	5733	6335	5486	4939	4939	4939	13119	21905	21905
Global average	**5329**	**5455**	**6098**	**8722**	**9678**	**2553**	**2332**	**2819**	**6049**	**5234**	**1504**	**1498**	**3913**	**10822**	**14516**	**14592**

Product codes	020130	020210	020220	020230	020311	020312	020319	020321	020322	020329	020410	020421	020422	020423	020430	020441
Afghanistan	32184	22849	22849	32184	3085	4009	4229	3085	4009	4229	6956	9975	9980	12482	6956	9980
Albania	31577	22418	22418	31577	7257	9427	9943	7257	9427	9943	6891	9882	9887	12365	6891	9887
Algeria	35607	25279	25279	35607	9551	12407	13087	9551	12407	13087	7900	11328	11333	14173	7900	11333
Andorra	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Angola	30318	21524	21524	30318	2481	3224	3401	2481	3224	3401	6494	9312	9317	11652	6494	9317
Anguilla	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Antigua Barbuda	26692	18949	18949	26692	4666	6063	6395	4666	6063	6395	6261	8978	8983	11235	6261	8983
Argentina	27165	19285	19285	27165	3830	4977	5249	3830	4977	5249	6347	9101	9106	11389	6347	9106
Armenia	30536	21679	21679	30536	2980	3873	4085	2980	3873	4085	6650	9535	9540	11932	6650	9540
Aruba	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Australia	27590	19587	19587	27590	6751	8771	9251	6751	8771	9251	6784	9728	9733	12173	6784	9733
Austria	18883	13405	13405	18883	2549	3313	3495	2549	3313	3495	5735	8224	8229	10292	5735	8229
Azerbaijan	32489	23065	23065	32489	15163	19695	20774	15163	19695	20774	7161	10269	10274	12849	7161	10274
Bahamas	32607	23149	23149	32607	7221	9381	9895	7221	9381	9895	7505	10762	10767	13466	7505	10767
Bahrain	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Bangladesh	36558	25954	25954	36558	4807	6245	6587	4807	6245	6587	8023	11504	11509	14393	8023	11509
Barbados	25891	18381	18381	25891	4125	5360	5653	4125	5360	5653	6159	8832	8837	11053	6159	8837
Belarus	27805	19739	19739	27805	5002	6499	6855	5002	6499	6855	6675	9572	9577	11978	6675	9577
Belgium-Luxembourg	18050	12813	12813	18050	2028	2636	2780	2028	2636	2780	5558	7971	7976	9976	5558	7976
Belize	26473	18794	18794	26473	4868	6325	6672	4868	6325	6672	6303	9039	9044	11311	6303	9044
Benin	29938	21254	21254	29938	6544	8502	8968	6544	8502	8968	6538	9375	9380	11732	6538	9380
Bermuda	31863	22621	22621	31863	3403	4422	4664	3403	4422	4664	6979	10008	10013	12522	6979	10013
Bhutan	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Bolivia	34905	24780	24780	34905	4384	5696	6008	4384	5696	6008	7628	10939	10944	13686	7628	10944
Bosnia Herzegovina	27282	19369	19369	27282	2473	3215	3391	2473	3215	3391	6001	8605	8610	10768	6001	8610
British indian ocean territory	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
British virgin islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Brazil	30888	21929	21929	30888	5518	7169	7561	5518	7169	7561	6708	9618	9623	12035	6708	9623
Brunei	22094	15685	15685	22094	3706	4816	5080	3706	4816	5080	6040	8661	8666	10839	6040	8666
Bulgaria	26059	18500	18500	26059	4477	5817	6135	4477	5817	6135	6322	9066	9071	11344	6322	9071
Burkina Faso	30337	21537	21537	30337	10205	13256	13982	10205	13256	13982	6601	9465	9470	11844	6601	9470
Burundi	30935	21962	21962	30935	4931	6406	6757	4931	6406	6757	6602	9467	9472	11847	6602	9472
Cambodia	28950	20553	20553	28950	2529	3287	3467	2529	3287	3467	6286	9014	9019	11280	6286	9019
Cameroon	29264	20776	20776	29264	4442	5771	6087	4442	5771	6087	6354	9111	9116	11401	6354	9116
Canada	22671	16094	16094	22671	3615	4697	4955	3615	4697	4955	6060	8689	8694	10874	6060	8694
Cape Verde	35164	24965	24965	35164	12111	15731	16593	12111	15731	16593	7332	10514	10519	13155	7332	10519
Cayman Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Centtral African Republic	28928	20537	20537	28928	4274	5553	5858	4274	5553	5858	6265	8984	8989	11243	6265	8989
Chad	32862	23330	23330	32862	9974	12955	13665	9974	12955	13665	7008	10049	10054	12574	7008	10054
Chile	23713	16834	16834	23713	2945	3827	4037	2945	3827	4037	5869	8416	8421	10533	5869	8421
China	29625	21032	21032	29625	2786	3621	3819	2786	3621	3819	6352	9109	9114	11399	6352	9114
Christmas Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Cocos Islnds	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Colombia	27712	19673	19673	27712	4450	5782	6099	4450	5782	6099	6378	9145	9150	11444	6378	9150
Comoros	28308	20096	20096	28308	2481	3224	3401	2481	3224	3401	6139	8803	8808	11016	6139	8808
Congo	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Congo, D.R.	37178	26394	26394	37178	7992	10381	10950	7992	10381	10950	8173	11720	11725	14663	8173	11725
Cook Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Costa Rica	25314	17971	17971	25314	3926	5101	5381	3926	5101	5381	6172	8851	8856	11076	6172	8856
Cote d'Ivoire	30261	21483	21483	30261	10638	13818	14575	10638	13818	14575	6580	9436	9441	11808	6580	9441
Croatia	25209	17896	17896	25209	3709	4819	5084	3709	4819	5084	6202	8893	8898	11129	6202	8898
Cuba	28886	20507	20507	28886	4980	6470	6824	4980	6470	6824	6310	9048	9053	11323	6310	9053
Cyprus	29100	20659	20659	29100	5324	6917	7296	5324	6917	7296	6768	9705	9710	12144	6768	9710
Czech Republic	23292	16535	16535	23292	2882	3745	3950	2882	3745	3950	5890	8446	8451	10570	5890	8451
Denmark	18420	13076	13076	18420	2467	3206	3382	2467	3206	3382	5697	8169	8174	10224	5697	8174
Djibouti	29516	20954	20954	29516	2481	3224	3401	2481	3224	3401	6362	9123	9128	11416	6362	9128
Dominica	30151	21405	21405	30151	7619	9898	10440	7619	9898	10440	6933	9941	9946	12439	6933	9946
Dominican Republic	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Ecuador	34719	24648	24648	34719	8925	11594	12229	8925	11594	12229	7817	11209	11214	14024	7817	11214
Egypt	37043	26298	26298	37043	5160	6704	7071	5160	6704	7071	7200	10325	10330	12919	7200	10330
El Salvador	29614	21024	21024	29614	5500	7146	7538	5500	7146	7538	6444	9240	9245	11562	6444	9245
EquatorialGuinea	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Eritrea	33530	23804	23804	33530	4691	6095	6429	4691	6095	6429	7198	10322	10327	12915	7198	10327
Estonia	29088	20651	20651	29088	4938	6416	6768	4938	6416	6768	6832	9798	9803	12259	6832	9803
Ethiopia	34998	24847	24847	34998	5798	7533	7946	5798	7533	7946	7569	10854	10859	13580	7569	10859
Faeroe Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Falkland Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Fiji	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Finland	22575	16026	16026	22575	4712	6122	6458	4712	6122	6458	6214	8910	8915	11151	6214	8915
France	18223	12936	12936	18223	2141	2783	2936	2141	2783	2936	5616	8053	8058	10079	5616	8058
French Guiana	28482	20220	20220	28482	6239	8105	8549	6239	8105	8549	6487	9302	9307	11640	6487	9307

Product codes	020130	020210	020220	020230	020311	020312	020319	020321	020322	020329	020410	020421	020422	020423	020430	020441
French Polynesia	22094	15685	15685	22094	3706	4816	5080	3706	4816	5080	6040	8661	8666	10839	6040	8666
French Southern Ant. Teritory	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Gabon	25826	18334	18334	25826	3973	5162	5445	3973	5162	5445	6163	8837	8842	11059	6163	8842
Gambia	29730	21106	21106	29730	6767	8791	9273	6767	8791	9273	6457	9259	9264	11586	6457	9264
Georgia	33214	23580	23580	33214	3346	4348	4586	3346	4348	4586	6788	9734	9739	12180	6788	9739
Germany	18279	12976	12976	18279	2333	3032	3198	2333	3032	3198	5635	8080	8085	10112	5635	8085
Ghana	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Gibraltar	8383	5950	5950	8383	80	107	113	80	107	113	201	2389	2394	2998	201	2394
Greece	30017	21310	21310	30017	5553	7214	7609	5553	7214	7609	6743	9670	9675	12099	6743	9675
Greenland	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Grenada	25180	17876	17876	25180	3506	4555	4805	3506	4555	4805	6098	8744	8749	10942	6098	8749
Guadeloupe	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Guatemala	34949	24811	24811	34949	8023	10422	10993	8023	10422	10993	7750	11113	11118	13904	7750	11118
Guinea	28866	20493	20493	28866	5813	7552	7966	5813	7552	7966	6264	8983	8988	11241	6264	8988
Guineabissau	29635	21039	21039	29635	5711	7419	7826	5711	7419	7826	6405	9185	9190	11494	6405	9190
Guyana	29211	20738	20738	29211	2481	3224	3401	2481	3224	3401	6306	9042	9047	11315	6306	9047
Haiti	30314	21521	21521	30314	5218	6779	7150	5218	6779	7150	6542	9381	9386	11738	6542	9386
Honduras	29480	20929	20929	29480	4520	5873	6195	4520	5873	6195	6340	9091	9096	11377	6340	9096
Hong Kong	22094	15685	15685	22094	3706	4816	5080	3706	4816	5080	6040	8661	8666	10839	6040	8666
Hungary	24226	17199	17199	24226	3065	3984	4202	3065	3984	4202	6006	8612	8617	10778	6006	8617
Iceland	22094	15685	15685	22094	3706	4816	5080	3706	4816	5080	6040	8661	8666	10839	6040	8666
India	33815	24006	24006	33815	8331	10822	11415	8331	10822	11415	7079	10151	10156	12701	7079	10156
Indonesia	31476	22346	22346	31476	5060	6575	6935	5060	6575	6935	6465	9270	9275	11600	6465	9275
Iran	37115	26349	26349	37115	10059	13066	13782	10059	13066	13782	8413	12064	12069	15092	8413	12069
Iraq	37098	26338	26338	37098	18283	23746	25048	18283	23746	25048	8170	11716	11721	14657	8170	11721
Ireland	17854	12674	12674	17854	2230	2899	3057	2230	2899	3057	5609	8043	8048	10067	5609	8048
Israel	36451	25878	25878	36451	8520	11068	11674	8520	11068	11674	8279	11872	11877	14852	8279	11877
Italy	22573	16025	16025	22573	3824	4968	5241	3824	4968	5241	6105	8754	8759	10955	6105	8759
Jamaica	28987	20579	20579	28987	5357	6959	7341	5357	6959	7341	6448	9246	9251	11569	6448	9251
Japan	22432	15924	15924	22432	4502	5850	6170	4502	5850	6170	6043	8666	8671	10845	6043	8671
Jordan	34047	24171	24171	34047	9563	12422	13103	9563	12422	13103	7458	10694	10699	13381	7458	10699
Kazakstan	44578	31648	31648	44578	6944	9021	9515	6944	9021	9515	7722	11073	11078	13854	7722	11078
Kenya	30078	21353	21353	30078	5684	7384	7789	5684	7384	7789	6499	9319	9324	11662	6499	9324
Kiribati	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
North Korea	27954	19845	19845	27954	5125	6659	7024	5125	6659	7024	6366	9128	9133	11423	6366	9133
South Korea	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Kuwait	22094	15685	15685	22094	3706	4816	5080	3706	4816	5080	6040	8661	8666	10839	6040	8666
Kyrgyzstan	30184	21429	21429	30184	17162	22290	23512	17162	22290	23512	6610	9478	9483	11860	6610	9483
Laos	28538	20260	20260	28538	3028	3935	4151	3028	3935	4151	6223	8923	8928	11167	6223	8928
Latvia	27616	19605	19605	27616	4695	6100	6434	4695	6100	6434	6593	9453	9458	11829	6593	9458
Lebanon	26124	18546	18546	26124	4905	6372	6722	4905	6372	6722	6312	9052	9057	11327	6312	9057
Liberia	7903	5609	5609	7903	159	209	220	159	209	220	211	2501	2506	3139	211	2506
Libya	35667	25322	25322	35667	6875	8931	9421	6875	8931	9421	7768	11139	11144	13936	7768	11144
Lithuania	29161	20702	20702	29161	3125	4062	4284	3125	4062	4284	6402	9180	9185	11488	6402	9185
Macau	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Macedonia	25788	18307	18307	25788	3993	5189	5473	3993	5189	5473	6200	8890	8895	11125	6200	8895
Madagascar	30550	21688	21688	30550	9075	11789	12434	9075	11789	12434	6620	9492	9497	11878	6620	9497
Malawi	29492	20938	20938	29492	5329	6923	7302	5329	6923	7302	6359	9119	9124	11411	6359	9124
Malaysia	30419	21596	21596	30419	6517	8466	8930	6517	8466	8930	6963	9984	9989	12493	6963	9989
Maldives	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Mali	29869	21205	21205	29869	6490	8432	8894	6490	8432	8894	6438	9231	9236	11552	6438	9236
Malta	24145	17141	17141	24145	3048	3961	4179	3048	3961	4179	5992	8592	8597	10753	5992	8597
Marshall Islands	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Martinique	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Mauritania	45197	32088	32088	45197	16521	21458	22634	16521	21458	22634	9674	13872	13877	17352	9674	13877
Mauritius	25028	17768	17768	25028	3204	4163	4392	3204	4163	4392	6050	8676	8681	10857	6050	8681
Mexico	29383	20860	20860	29383	4480	5821	6140	4480	5821	6140	6493	9311	9316	11651	6493	9316
Micronesia	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Moldova	29866	21203	21203	29866	3181	4134	4360	3181	4134	4360	6517	9345	9350	11694	6517	9350
Mongolia	30522	21668	21668	30522	2481	3224	3401	2481	3224	3401	6345	9098	9103	11385	6345	9103
Montserrat	28990	20581	20581	28990	2481	3224	3401	2481	3224	3401	6265	8983	8988	11242	6265	8988
Morocco	37334	26505	26505	37334	13685	17775	18749	13685	17775	18749	8040	11529	11534	14424	8040	11534
Mozambique	28846	20478	20478	28846	4488	5832	6151	4488	5832	6151	6214	8910	8915	11150	6214	8915
Myanmar	32411	23010	23010	32411	5389	7001	7385	5389	7001	7385	7048	10107	10112	12647	7048	10112
N.Caledonia	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
N.Mariana	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Nauru	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Nepal	32942	23386	23386	32942	4108	5338	5631	4108	5338	5631	7205	10331	10336	12926	7205	10336
Netherlands Antilles	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Netherlands	18065	12824	12824	18065	2304	2995	3159	2304	2995	3159	5618	8056	8061	10082	5618	8061
New Zealand	24820	17620	17620	24820	4153	5396	5691	4153	5396	5691	6033	8651	8656	10827	6033	8656
Nicaragua	31739	22533	22533	31739	4130	5366	5660	4130	5366	5660	6585	9443	9448	11817	6585	9448
Niger	36670	26034	26034	36670	24597	31947	33697	24597	31947	33697	8114	11636	11641	14557	8114	11641
Nigeria	31029	22029	22029	31029	9088	11806	12453	9088	11806	12453	6742	9667	9672	12097	6742	9672

Product codes	020130	020210	020220	020230	020311	020312	020319	020321	020322	020329	020410	020421	020422	020423	020430	020441
Niue	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Norfolk Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Norway	22206	15765	15765	22206	3732	4849	5114	3732	4849	5114	6077	8715	8720	10906	6077	8720
Oman	41800	29676	29676	41800	10165	13204	13927	10165	13204	13927	8610	12347	12352	15446	8610	12352
Pakistan	34359	24393	24393	34359	11694	15189	16021	11694	15189	16021	7581	10870	10875	13600	7581	10875
Palau	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Panama	28070	19927	19927	28070	6363	8266	8719	6363	8266	8719	6536	9373	9378	11728	6536	9378
Papua New Guinea	27836	19761	19761	27836	2378	3091	3260	2378	3091	3260	6051	8677	8682	10859	6051	8682
Paraguay	31284	22210	22210	31284	7325	9516	10037	7325	9516	10037	7015	10060	10065	12587	7015	10065
Peru	33345	23673	23673	33345	6944	9020	9514	6944	9020	9514	7390	10597	10602	13259	7390	10602
Philippines	28703	20377	20377	28703	4542	5902	6225	4542	5902	6225	6245	8955	8960	11206	6245	8960
Pitcairn	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Poland	23910	16974	16974	23910	2828	3675	3877	2828	3675	3877	5944	8524	8529	10668	5944	8529
Portugal	35690	25338	25338	35690	5819	7560	7974	5819	7560	7974	7261	10411	10416	13027	7261	10416
Qatar	25624	18191	18191	25624	3417	4440	4683	3417	4440	4683	6169	8846	8851	11070	6169	8851
Reunion	25829	18337	18337	25829	3717	4830	5095	3717	4830	5095	6203	8895	8900	11132	6203	8900
Romania	26339	18699	18699	26339	4061	5276	5565	4061	5276	5565	6252	8965	8970	11219	6252	8970
Russia	30785	21855	21855	30785	6623	8604	9075	6623	8604	9075	6951	9968	9973	12472	6951	9973
Rwanda	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
South Africa	37847	26869	26869	37847	9692	12590	13280	9692	12590	13280	7981	11445	11450	14319	7981	11450
St.Vincent-Grenadine	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Samoa	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Sao Tome Prncipe	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Saudi Arabia	26718	18968	18968	26718	5496	7140	7532	5496	7140	7532	6305	9042	9047	11314	6305	9047
Senegal	29481	20930	20930	29481	5917	7688	8109	5917	7688	8109	6388	9160	9165	11463	6388	9165
Seychelles	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Sierra Leone	28944	20549	20549	28944	5245	6815	7188	5245	6815	7188	6275	8998	9003	11260	6275	9003
Singapore	26489	18805	18805	26489	6791	8822	9305	6791	8822	9305	6782	9724	9729	12168	6782	9729
Slovakia	24731	17557	17557	24731	3782	4914	5183	3782	4914	5183	6104	8753	8758	10953	6104	8758
Slovenia	24993	17743	17743	24993	3174	4124	4350	3174	4124	4350	6046	8670	8675	10850	6046	8675
Solomon Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Somalia	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Spain	28139	19977	19977	28139	3375	4386	4626	3375	4386	4626	6339	9090	9095	11375	6339	9095
Spec Cats	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Sri Lanka	29954	21265	21265	29954	8024	10423	10994	8024	10423	10994	6551	9394	9399	11755	6551	9399
St. Helena	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
St. Kitts Nev	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
St. Lucia	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
St. Pier. Miqu	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Sudan	31197	22148	22148	31197	7215	9373	9886	7215	9373	9886	6673	9568	9573	11973	6673	9573
Suriname	27855	19775	19775	27855	6230	8094	8537	6230	8094	8537	6500	9321	9326	11664	6500	9326
Sweden	19623	13930	13930	19623	2921	3796	4004	2921	3796	4004	5835	8367	8372	10471	5835	8372
Switzerland-Liechnstine	20653	14662	14662	20653	2633	3422	3610	2633	3422	3610	5795	8309	8314	10399	5795	8314
Syria	49355	35040	35040	49355	13431	17445	18401	13431	17445	18401	11076	15883	15888	19866	11076	15888
Taiwan	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
Tajikistan	30892	21932	21932	30892	8816	11451	12079	8816	11451	12079	6668	9562	9567	11965	6668	9567
Tanzania	31186	22140	22140	31186	7325	9515	10037	7325	9515	10037	6832	9796	9801	12258	6832	9801
Thailand	34494	24489	24489	34494	7109	9235	9742	7109	9235	9742	7516	10777	10782	13484	7516	10782
Togo	30116	21380	21380	30116	6642	8628	9101	6642	8628	9101	6494	9312	9317	11653	6494	9317
Tokelau	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Tonga	24902	17679	17679	24902	3064	3981	4199	3064	3981	4199	6034	8653	8658	10829	6034	8658
Trinidad Tobago	26069	18507	18507	26069	4376	5685	5997	4376	5685	5997	6221	8921	8926	11164	6221	8926
Tunisia	94259	66922	66922	94259	14539	18885	19919	14539	18885	19919	11026	15810	15815	19775	11026	15815
Turkey	26039	18486	18486	26039	3578	4650	4904	3578	4650	4904	6006	8613	8618	10779	6006	8618
Turkmenistan	46327	32890	32890	46327	6001	7796	8224	6001	7796	8224	10358	14852	14857	18578	10358	14857
Turks Caicos Island	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Tuvalu	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Uganda	29740	21113	21113	29740	4067	5285	5574	4067	5285	5574	6435	9228	9233	11547	6435	9233
Ukraine	30738	21822	21822	30738	5163	6707	7075	5163	6707	7075	6631	9508	9513	11898	6631	9513
United Arab Emirates	29343	20831	20831	29343	9332	12122	12786	9332	12122	12786	6985	10016	10021	12532	6985	10021
United Kingdom	18259	12962	12962	18259	2328	3026	3192	2328	3026	3192	5671	8131	8136	10177	5671	8136
Uruguay	32183	22848	22848	32183	4717	6129	6465	4717	6129	6465	6721	9637	9642	12059	6721	9642
US Msc.Pacific	24902	17679	17679	24902	3094	4020	4240	3094	4020	4240	6034	8653	8658	10829	6034	8658
USA	23674	16806	16806	23674	3723	4838	5103	3723	4838	5103	6108	8758	8763	10960	6108	8763
Uzbekistan	31681	22491	22491	31681	4423	5746	6061	4423	5746	6061	6969	9994	9999	12505	6969	9999
Vanuatu	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Venezuela	34371	24401	24401	34371	7290	9470	9989	7290	9470	9989	7381	10584	10589	13242	7381	10589
Viet Nam	32802	23287	23287	32802	3560	4626	4879	3560	4626	4879	7212	10342	10347	12940	7212	10347
Wallis Futuna Islands	27710	19672	19672	27710	2481	3224	3401	2481	3224	3401	6029	8645	8650	10819	6029	8650
Yemen	32627	23163	23163	32627	4566	5932	6257	4566	5932	6257	7064	10130	10135	12675	7064	10135
Yugoslavia	26916	19108	19108	26916	4062	5279	5568	4062	5279	5568	6354	9111	9116	11402	6354	9116
Zambia	34725	24653	24653	34725	6727	8739	9218	6727	8739	9218	7649	10968	10973	13723	7649	10973
Zimbabe	30855	21905	21905	30855	6319	8209	8659	6319	8209	8659	6765	9701	9706	12139	6765	9706
Global average	**23685**	**19981**	**15666**	**24838**	**2453**	**3229**	**3681**	**3038**	**3895**	**3973**	**5741**	**8751**	**9064**	**11662**	**6103**	**9232**

Product codes	020442	020443	020450	020500	020610	020621	020622	020629	020630	020641	020649	020680	020690	020810	020820	020890
Afghanistan	9980	12482	9000	8145	12896	30595	9012	14763	924	505	924	5953	5953	9641	9641	12896
Albania	9887	12365	8873	8187	12652	30017	8842	14485	2175	1187	2175	5898	5898	7171	7171	12652
Algeria	11333	14173	8248	8841	14267	33849	9970	16333	2862	1562	2862	6761	6761	12352	12352	14267
Andorra	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Angola	9317	11652	8751	8100	12148	28820	8489	13907	743	406	743	5557	5557	13145	13145	12148
Anguilla	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Antigua Barbuda	8983	11235	6865	8134	10695	25373	7474	12244	1398	763	1398	5358	5358	6244	6244	10695
Argentina	9106	11389	6614	8341	10884	25823	7606	12461	1148	626	1148	5431	5431	2996	2996	10884
Armenia	9540	11932	8565	7999	12235	29028	8550	14007	893	487	893	5691	5691	5093	5093	12235
Aruba	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Australia	9733	12173	5473	9014	11055	26227	7725	12656	2023	1104	2023	5806	5806	3056	3056	11055
Austria	8229	10292	4077	6847	7566	17949	5287	8661	764	417	764	4908	4908	1147	1147	7566
Azerbaijan	10274	12849	9397	8385	13018	30884	9097	14903	4544	2480	4544	6129	6129	5739	5739	13018
Bahamas	10767	13466	8133	8649	13065	30997	9130	14957	2164	1181	2164	6423	6423	5263	5263	13065
Bahrain	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Bangladesh	11509	14393	10417	8564	14648	34753	10237	16770	1440	786	1440	6866	6866	10049	10049	14648
Barbados	8837	11053	6547	7987	10374	24612	7250	11876	1236	675	1236	5271	5271	4516	4516	10374
Belarus	9577	11978	6921	7852	11141	26431	7785	12754	1499	818	1499	5713	5713	4629	4629	11141
Belgium-Luxembourg	7976	9976	3974	6951	7232	17157	5054	8279	608	332	608	4757	4757	1158	1158	7232
Belize	9044	11311	6875	8318	10607	25165	7413	12143	1459	796	1459	5394	5394	5715	5715	10607
Benin	9380	11732	8937	8301	11995	28459	8383	13732	1961	1070	1961	5595	5595	10887	10887	11995
Bermuda	10013	12522	9005	8163	12767	30289	8922	14616	1020	557	1020	5973	5973	5933	5933	12767
Bhutan	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Bolivia	10944	13686	9778	8400	13986	33181	9774	16011	1314	717	1314	6528	6528	9098	9098	13986
Bosnia Herzegovina	8610	10768	7799	7627	10931	25934	7639	12514	741	405	741	5135	5135	3657	3657	10931
British indian ocean territory	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
British virgin islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Brazil	9623	12035	7181	9445	12376	29363	8649	14169	1654	903	1654	5740	5740	4298	4298	12376
Brunei	8666	10839	4515	7831	8852	21002	6186	10134	1111	606	1111	5169	5169	1686	1686	8852
Bulgaria	9071	11344	6668	8033	10441	24771	7297	11953	1342	732	1342	5410	5410	4383	4383	10441
Burkina Faso	9470	11844	9170	8357	12155	28838	8495	13916	3058	1669	3058	5649	5649	12021	12021	12155
Burundi	9472	11847	8916	8247	12395	29407	8662	14190	1478	806	1478	5650	5650	16225	16225	12395
Cambodia	9019	11280	8269	7951	11600	27520	8106	13280	758	414	758	5380	5380	7045	7045	11600
Cameroon	9116	11401	8445	8118	11726	27819	8194	13424	1331	726	1331	5437	5437	9371	9371	11726
Canada	8694	10874	4534	8032	9083	21550	6348	10399	1083	591	1083	5186	5186	1753	1753	9083
Cape Verde	10519	13155	10232	9692	14090	33428	9846	16130	3629	1981	3629	6275	6275	24520	24520	14090
Cayman Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Centtral African Republic	8989	11243	8384	7984	11591	27499	8100	13269	1281	699	1281	5362	5362	7534	7534	11591
Chad	10054	12574	9841	8531	13167	31239	9202	15074	2989	1631	2989	5997	5997	21361	21361	13167
Chile	8421	10533	6018	7666	9501	22541	6640	10877	883	482	883	5023	5023	2550	2550	9501
China	9114	11399	8281	8182	11870	28161	8295	13589	835	456	835	5436	5436	4001	4001	11870
Christmas Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Cocos Islnds	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Colombia	9150	11444	6832	8417	11103	26343	7759	12711	1334	728	1334	5458	5458	4985	4985	11103
Comoros	8808	11016	8073	7868	11342	26909	7926	12985	743	406	743	5254	5254	5443	5443	11342
Congo	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Congo, D.R.	11725	14663	10924	8909	14897	35342	10410	17054	2395	1307	2395	6995	6995	15630	15630	14897
Cook Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Costa Rica	8856	11076	6384	7735	10142	24063	7088	11611	1177	642	1177	5282	5282	3959	3959	10142
Cote d'Ivoire	9441	11808	9124	8330	12125	28766	8473	13881	3188	1740	3188	5631	5631	11605	11605	12125
Croatia	8898	11129	6316	7577	10100	23963	7059	11563	1111	607	1111	5308	5308	3432	3432	10100
Cuba	9053	11323	8161	7948	11574	27459	8088	13250	1492	815	1492	5400	5400	5443	5443	11574
Cyprus	9710	12144	7046	8206	11660	27663	8148	13348	1595	871	1595	5792	5792	6059	6059	11660
Czech Republic	8451	10570	5989	7344	9332	22141	6522	10684	864	471	864	5041	5041	2213	2213	9332
Denmark	8174	10224	4060	6778	7380	17509	5157	8449	739	403	739	4876	4876	1122	1122	7380
Djibouti	9128	11416	8641	8048	11826	28058	8265	13539	743	406	743	5444	5444	10225	10225	11826
Dominica	9946	12439	7728	8500	12081	28661	8442	13830	2283	1246	2283	5933	5933	7214	7214	12081
Dominican Republic	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Ecuador	11214	14024	8401	8845	13911	33004	9722	15926	2675	1460	2675	6690	6690	9284	9284	13911
Egypt	10330	12919	7981	11621	14842	35213	10372	16992	1546	844	1546	6162	6162	2920	2920	14842
El Salvador	9245	11562	6989	9315	11866	28151	8292	13584	1648	900	1648	5514	5514	5507	5507	11866
EquatorialGuinea	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Eritrea	10327	12915	9549	8342	13435	31874	9389	15380	1406	767	1406	6160	6160	14997	14997	13435
Estonia	9803	12259	6969	8118	11655	27651	8145	13343	1480	808	1480	5847	5847	3913	3913	11655
Ethiopia	10859	13580	9764	8407	14023	33270	9800	16054	1738	948	1738	6477	6477	13006	13006	14023
Faeroe Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Falkland Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Fiji	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Finland	8915	11151	4679	7575	9045	21459	6321	10355	1412	771	1412	5318	5318	2552	2552	9045
France	8058	10079	3963	6772	7301	17322	5102	8358	642	350	642	4806	4806	1031	1031	7301
French Guiana	9307	11640	7577	8463	11412	27074	7975	13064	1870	1020	1870	5551	5551	10104	10104	11412

Product codes	020442	020443	020450	020500	020610	020621	020622	020629	020630	020641	020649	020680	020690	020810	020820	020890
French Polynesia	8666	10839	4515	7831	8852	21002	6186	10134	1111	606	1111	5169	5169	1686	1686	8852
French Southern Ant. Teritory	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Gabon	8842	11059	6539	8013	10348	24549	7231	11846	1190	650	1190	5274	5274	4375	4375	10348
Gambia	9264	11586	8670	8114	11912	28261	8325	13637	2028	1107	2028	5526	5526	9199	9199	11912
Georgia	9739	12180	9029	9119	13308	31573	9300	15235	1003	547	1003	5809	5809	7034	7034	13308
Germany	8085	10112	3988	6748	7324	17375	5118	8384	699	382	699	4822	4822	1138	1138	7324
Ghana	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Gibraltar	2394	2998	2839	5905	3358	11852	3491	5719	24	4	24	1426	1426	3080	3080	3358
Greece	9675	12099	7027	8893	12027	28534	8405	13769	1664	908	1664	5771	5771	5033	5033	12027
Greenland	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Grenada	8749	10942	6309	7950	10089	23936	7051	11550	1050	573	1050	5218	5218	2984	2984	10089
Guadeloupe	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Guatemala	11118	13904	8364	9355	14003	33222	9786	16031	2404	1312	2404	6632	6632	4394	4394	14003
Guinea	8988	11241	8372	7995	11566	27440	8083	13241	1742	951	1742	5361	5361	6976	6976	11566
Guineabissau	9190	11494	8732	8108	11874	28171	8298	13594	1711	934	1711	5482	5482	10040	10040	11874
Guyana	9047	11315	8498	8002	11704	27768	8179	13399	743	406	743	5396	5396	9020	9020	11704
Haiti	9386	11738	8982	8191	12146	28817	8488	13905	1564	853	1564	5598	5598	12292	12292	12146
Honduras	9096	11377	8242	7959	11812	28024	8255	13523	1355	739	1355	5426	5426	9308	9308	11812
Hong Kong	8666	10839	4515	7831	8852	21002	6186	10134	1111	606	1111	5169	5169	1686	1686	8852
Hungary	8617	10778	6105	7515	9707	23029	6783	11112	919	501	919	5140	5140	2284	2284	9707
Iceland	8666	10839	4515	7831	8852	21002	6186	10134	1111	606	1111	5169	5169	1686	1686	8852
India	10156	12701	9351	9013	13549	32145	9468	15511	2497	1363	2497	6058	6058	10909	10909	13549
Indonesia	9275	11600	8523	8609	12612	29921	8814	14438	1516	828	1516	5532	5532	11136	11136	12612
Iran	12069	15092	9000	9114	14871	35282	10393	17025	3014	1645	3014	7200	7200	6684	6684	14871
Iraq	11721	14657	8952	9475	14864	35266	10388	17017	5479	2990	5479	6992	6992	14866	14866	14864
Ireland	8048	10067	4014	6736	7153	16971	4999	8189	668	365	668	4800	4800	1177	1177	7153
Israel	11877	14852	8715	9000	14605	34651	10207	16720	2553	1394	2553	7085	7085	6980	6980	14605
Italy	8759	10955	4503	7845	9044	21457	6320	10354	1146	625	1146	5224	5224	2112	2112	9044
Jamaica	9251	11569	7309	8865	11614	27555	8117	13296	1605	876	1605	5518	5518	7731	7731	11614
Japan	8671	10845	4758	8006	8987	21323	6281	10289	1349	736	1349	5172	5172	2633	2633	8987
Jordan	10699	13381	7179	8429	13642	32366	9534	15618	2866	1564	2866	6382	6382	16521	16521	13642
Kazakstan	11078	13854	8833	13908	17862	42377	12483	20449	2081	1136	2081	6608	6608	8778	8778	17862
Kenya	9324	11662	8631	8136	12051	28592	8422	13797	1703	930	1703	5562	5562	10426	10426	12051
Kiribati	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
North Korea	9133	11423	6778	8833	11200	26572	7827	12822	1536	838	1536	5448	5448	3680	3680	11200
South Korea	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Kuwait	8666	10839	4515	7831	8852	21002	6186	10134	1111	606	1111	5169	5169	1686	1686	8852
Kyrgyzstan	9483	11860	8837	8300	12094	28693	8452	13846	5143	2807	5143	5657	5657	7784	7784	12094
Laos	8928	11167	8235	7992	11434	27128	7991	13090	907	495	907	5325	5325	6273	6273	11434
Latvia	9458	11829	6868	8129	11065	26251	7733	12667	1407	768	1407	5642	5642	3567	3567	11065
Lebanon	9057	11327	6837	8444	10467	24833	7315	11983	1470	802	1470	5402	5402	5024	5024	10467
Liberia	2506	3139	2491	6409	3166	11173	3291	5392	48	8	48	1493	1493	5024	5024	3166
Libya	11144	13936	10059	8482	14291	33906	9987	16361	2060	1125	2060	6647	6647	11039	11039	14291
Lithuania	9185	11488	8270	7924	11684	27720	8165	13376	937	511	937	5479	5479	4178	4178	11684
Macau	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Macedonia	8895	11125	6441	7933	10332	24513	7221	11829	1197	653	1197	5306	5306	2821	2821	10332
Madagascar	9497	11878	9132	8331	12241	29041	8554	14013	2720	1484	2720	5665	5665	12975	12975	12241
Malawi	9124	11411	8354	8056	11817	28035	8258	13528	1597	872	1597	5442	5442	9994	9994	11817
Malaysia	9989	12493	7340	8484	12188	28917	8518	13953	1953	1066	1953	5959	5959	9587	9587	12188
Maldives	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Mali	9236	11552	8512	8068	11968	28394	8364	13701	1945	1062	1945	5509	5509	10381	10381	11968
Malta	8597	10753	6071	7511	9674	22952	6761	11075	913	499	913	5128	5128	2383	2383	9674
Marshall Islands	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Martinique	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Mauritania	13877	17352	13488	9649	18110	42966	12656	20733	4951	2702	4951	8278	8278	35054	35054	18110
Mauritius	8681	10857	6204	7828	10028	23791	7008	11480	960	524	960	5178	5178	2654	2654	10028
Mexico	9316	11651	6960	9192	11773	27931	8227	13478	1343	733	1343	5557	5557	3611	3611	11773
Micronesia	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Moldova	9350	11694	8485	8030	11966	28390	8363	13699	953	520	953	5577	5577	5839	5839	11966
Mongolia	9103	11385	7958	7872	12229	29014	8546	14000	743	406	743	5430	5430	16581	16581	12229
Montserrat	8988	11242	8393	7969	11615	27557	8117	13298	743	406	743	5361	5361	8142	8142	11615
Morocco	11534	14424	9869	9649	14959	35490	10454	17126	4101	2238	4101	6881	6881	18548	18548	14959
Mozambique	8915	11150	8131	7913	11558	27421	8077	13232	1345	734	1345	5317	5317	7612	7612	11558
Myanmar	10112	12647	9227	8295	12986	30810	9075	14867	1615	881	1615	6032	6032	10536	10536	12986
N.Caledonia	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
N.Mariana	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Nauru	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Nepal	10336	12926	9373	8396	13199	31314	9224	15110	1231	672	1231	6166	6166	10810	10810	13199
Netherlands Antilles	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Netherlands	8061	10082	4006	6727	7238	17172	5058	8286	690	377	690	4808	4808	1185	1185	7238
New Zealand	8656	10827	6602	7857	9945	23594	6950	11385	1244	679	1244	5163	5163	5370	5370	9945
Nicaragua	9448	11817	8943	8756	12717	30172	8887	14559	1238	675	1238	5636	5636	9902	9902	12717
Niger	11641	14557	11081	9165	14693	34859	10268	16821	7371	4023	7371	6944	6944	16299	16299	14693
Nigeria	9672	12097	9313	8535	12433	29497	8688	14233	2724	1487	2724	5770	5770	16119	16119	12433

Product codes	020442	020443	020450	020500	020610	020621	020622	020629	020630	020641	020649	020680	020690	020810	020820	020890
Niue	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Norfolk Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Norway	8720	10906	4516	7841	8897	21109	6218	10186	1118	610	1118	5201	5201	1364	1364	8897
Oman	12352	15446	9521	11185	16749	39736	11705	19174	3046	1663	3046	7369	7369	6970	6970	16749
Pakistan	10875	13600	9749	8571	13767	32662	9621	15761	3504	1913	3504	6487	6487	10081	10081	13767
Palau	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Panama	9378	11728	7201	8532	11247	26683	7860	12876	1907	1041	1907	5594	5594	8814	8814	11247
Papua New Guinea	8682	10859	7851	7796	11153	26460	7794	12768	713	389	713	5179	5179	3597	3597	11153
Paraguay	10065	12587	7570	9017	12535	29739	8760	14350	2195	1198	2195	6004	6004	5709	5709	12535
Peru	10602	13259	7978	9197	13360	31698	9337	15295	2081	1136	2081	6324	6324	6775	6775	13360
Philippines	8960	11206	8277	7985	11501	27285	8037	13166	1361	743	1361	5344	5344	6793	6793	11501
Pitcairn	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Poland	8529	10668	6081	7521	9580	22728	6695	10967	847	463	847	5087	5087	2580	2580	9580
Portugal	10416	13027	7732	10546	14300	33928	9994	16371	1744	952	1744	6214	6214	5178	5178	14300
Qatar	8851	11070	6277	7859	10267	24358	7175	11754	1024	559	1024	5279	5279	2797	2797	10267
Reunion	8900	11132	6300	7915	10349	24553	7232	11848	1114	608	1114	5309	5309	3173	3173	10349
Romania	8970	11219	6516	8080	10553	25038	7375	12082	1217	664	1217	5350	5350	3253	3253	10553
Russia	9973	12472	7506	8948	12335	29264	8620	14121	1985	1083	1985	5949	5949	6041	6041	12335
Rwanda	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
South Africa	11450	14319	8874	10445	15165	35978	10598	17361	2904	1585	2904	6830	6830	6468	6468	15165
St.Vincent-Grenadine	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Samoa	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Sao Tome Prncipe	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Saudi Arabia	9047	11314	6820	8148	10705	25398	7481	12256	1647	899	1647	5396	5396	5328	5328	10705
Senegal	9165	11463	8620	8080	11812	28025	8255	13523	1773	968	1773	5467	5467	9029	9029	11812
Seychelles	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Sierra Leone	9003	11260	8403	7999	11597	27514	8105	13277	1572	858	1572	5370	5370	7403	7403	11597
Singapore	9729	12168	5416	8480	10613	25180	7417	12150	2035	1111	2035	5804	5804	3996	3996	10613
Slovakia	8758	10953	6330	7696	9909	23509	6925	11344	1133	619	1133	5224	5224	2992	2992	9909
Slovenia	8675	10850	6190	7822	10014	23758	6998	11464	951	519	951	5174	5174	2580	2580	10014
Solomon Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Somalia	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Spain	9095	11375	6596	8818	11274	26749	7879	12907	1011	552	1011	5425	5425	2464	2464	11274
Spec Cats	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Sri Lanka	9399	11755	8792	8233	12002	28474	8387	13740	2405	1312	2405	5606	5606	9518	9518	12002
St. Helena	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
St. Kitts Nev	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
St. Lucia	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
St. Pier. Miqu	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Sudan	9573	11973	9278	8343	12500	29656	8735	14310	2162	1180	2162	5710	5710	16772	16772	12500
Suriname	9326	11664	7475	8658	11161	26478	7799	12777	1867	1019	1867	5563	5563	8755	8755	11161
Sweden	8372	10471	4244	7055	7862	18653	5494	9001	875	478	875	4994	4994	1204	1204	7862
Switzerland-Liechnstine	8314	10399	4207	7632	8275	19632	5783	9473	789	431	789	4959	4959	1113	1113	8275
Syria	15888	19866	14038	9785	19776	46919	13820	22640	4025	2197	4025	9479	9479	12602	12602	19776
Taiwan	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
Tajikistan	9567	11965	8693	8139	12378	29366	8650	14170	2642	1442	2642	5707	5707	9724	9724	12378
Tanzania	9801	12258	9343	8579	12495	29645	8732	14305	2195	1198	2195	5846	5846	14507	14507	12495
Thailand	10782	13484	7890	9378	13821	32791	9659	15823	2130	1163	2130	6432	6432	7402	7402	13821
Togo	9317	11653	8306	8032	12067	28628	8433	13814	1990	1086	1990	5558	5558	10251	10251	12067
Tokelau	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Tonga	8658	10829	6154	7805	9978	23672	6973	11422	918	501	918	5164	5164	2383	2383	9978
Trinidad Tobago	8926	11164	6704	8159	10445	24781	7299	11958	1311	716	1311	5324	5324	4869	4869	10445
Tunisia	15815	19775	14757	32652	37769	89608	26395	43239	4357	2378	4357	9436	9436	4417	4417	37769
Turkey	8618	10779	6248	8397	10433	24753	7291	11944	1072	585	1072	5140	5140	2962	2962	10433
Turkmenistan	14857	18578	13025	9283	18563	44040	12972	21251	1798	982	1798	8864	8864	8310	8310	18563
Turks Caicos Island	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Tuvalu	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Uganda	9233	11547	8579	8115	11916	28271	8327	13642	1219	665	1219	5507	5507	10523	10523	11916
Ukraine	9513	11898	8776	8294	12316	29220	8607	14100	1547	844	1547	5674	5674	7911	7911	12316
United Arab Emirates	10021	12532	4912	8354	11757	27893	8216	13460	2797	1526	2797	5977	5977	11585	11585	11757
United Kingdom	8136	10177	4047	6729	7315	17356	5112	8375	698	381	698	4853	4853	1018	1018	7315
Uruguay	9642	12059	7196	10123	12895	30593	9011	14762	1414	772	1414	5752	5752	3621	3621	12895
US Msc.Pacific	8658	10829	6154	7805	9978	23672	6973	11422	927	506	927	5164	5164	2383	2383	9978
USA	8763	10960	4646	8473	9485	22504	6629	10859	1116	609	1116	5227	5227	1684	1684	9485
Uzbekistan	9999	12505	9084	8245	12694	30116	8871	14532	1325	723	1325	5964	5964	6232	6232	12694
Vanuatu	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Venezuela	10589	13242	7666	9356	13772	32674	9624	15766	2184	1192	2184	6316	6316	11643	11643	13772
Viet Nam	10347	12940	9326	8264	13143	31182	9185	15046	1067	582	1067	6172	6172	6356	6356	13143
Wallis Futuna Islands	8650	10819	7793	7779	11103	26341	7759	12711	743	406	743	5159	5159	3080	3080	11103
Yemen	10135	12675	9308	8254	13073	31016	9136	14966	1368	747	1368	6046	6046	10826	10826	13073
Yugoslavia	9116	11402	6596	8105	10784	25586	7536	12346	1217	664	1217	5438	5438	3879	3879	10784
Zambia	10973	13723	10092	8493	13914	33010	9724	15929	2016	1100	2016	6546	6546	8142	8142	13914
Zimbabe	9706	12139	8948	8182	12363	29331	8640	14153	1894	1034	1894	5790	5790	6345	6345	12363
Global average	**9029**	**11353**	**5911**	**8077**	**7815**	**22994**	**6727**	**11076**	**729**	**479**	**874**	**5085**	**5403**	**2714**	**8924**	**9573**

Product codes	020900	021011	021012	021019	021020	021090	030510	040110	040120	040130	040210	040221	040229	040291	040299	040310
Afghanistan	9641	4096	4320	4414	23320	18721	7510	2407	2487	4477	11192	11192	11202	3689	4482	2798
Albania	7171	9624	10151	10374	22880	18368	5584	2217	2291	4124	10309	10309	10319	3398	4129	2577
Algeria	12352	12665	13359	13652	25800	20712	9625	2492	2575	4636	11590	11590	11600	3820	4641	2897
Andorra	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Angola	13145	3295	3476	3551	21968	17635	10243	2655	2743	4937	12344	12344	12354	4068	4942	3086
Anguilla	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Antigua Barbuda	6244	6192	6530	6673	19341	15526	4860	1961	2027	3648	9121	9121	9131	3006	3653	2280
Argentina	2996	5083	5362	5479	19684	15801	2327	1485	1535	2762	6906	6906	6916	2276	2767	1726
Armenia	5093	3957	4174	4265	22126	17762	3963	2112	2182	3928	9820	9820	9830	3237	3933	2455
Aruba	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Australia	3056	8955	9445	9652	19992	16048	2373	1180	1219	2195	5488	5488	5498	1809	2200	1372
Austria	1147	3386	3571	3649	13684	10983	884	694	717	1290	3225	3225	3235	1063	1295	806
Azerbaijan	5739	20102	21203	21669	23541	18898	4467	2297	2374	4273	10683	10683	10693	3521	4278	2671
Bahamas	5263	9578	10102	10323	23627	18967	4095	2093	2162	3892	9731	9731	9741	3207	3897	2433
Bahrain	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Bangladesh	10049	6378	6727	6874	26489	21266	7828	2775	2868	5162	12905	12905	12915	4253	5167	3226
Barbados	4516	5474	5774	5900	18761	15060	3513	1690	1747	3144	7860	7860	7870	2591	3149	1965
Belarus	4629	6636	7000	7153	20147	16173	3601	1710	1767	3181	7952	7952	7962	2621	3186	1988
Belgium-Luxembourg	1158	2695	2842	2904	13080	10498	893	671	693	1248	3120	3120	3130	1028	1253	780
Belize	5715	6459	6813	6962	19182	15398	4448	1839	1900	3420	8549	8549	8559	2818	3425	2137
Benin	10887	8680	9156	9356	21692	17414	8482	2569	2654	4778	11944	11944	11954	3937	4783	2986
Bermuda	5933	4517	4764	4868	23088	18534	4618	2251	2326	4187	10467	10467	10477	3450	4192	2617
Bhutan	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Bolivia	9098	5817	6135	6269	25291	20304	7087	2501	2584	4651	11628	11628	11638	3832	4656	2907
Bosnia Herzegovina	3657	3285	3465	3540	19769	15869	2842	1940	2005	3609	9023	9023	9033	2974	3614	2256
British indian ocean territory	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
British virgin islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Brazil	4298	7320	7721	7890	22381	17967	3342	1674	1730	3114	7786	7786	7796	2566	3119	1946
Brunei	1686	4919	5189	5302	16010	12851	1305	821	848	1526	3816	3816	3826	1258	1531	954
Bulgaria	4383	5940	6266	6402	18883	15158	3409	1635	1690	3042	7605	7605	7615	2507	3047	1901
Burkina Faso	12021	13531	14272	14585	21982	17646	9366	2710	2800	5040	12600	12600	12610	4153	5045	3150
Burundi	16225	6542	6900	7051	22415	17994	12645	2733	2824	5084	12710	12710	12720	4189	5089	3177
Cambodia	7045	3359	3543	3620	20977	16840	5485	2242	2317	4170	10426	10426	10436	3436	4175	2606
Cameroon	9371	5894	6216	6352	21205	17022	7299	2294	2370	4266	10666	10666	10676	3515	4271	2666
Canada	1753	4798	5061	5171	16428	13187	1358	801	828	1490	3724	3724	3734	1227	1495	931
Cape Verde	24520	16057	16937	17309	25479	20455	19116	4830	4991	8984	22459	22459	22469	7402	8989	5615
Cayman Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Centtral African Republic	7534	5672	5982	6113	20961	16827	5867	2297	2374	4273	10683	10683	10693	3521	4278	2671
Chad	21361	13225	13949	14255	23811	19115	16651	3351	3462	6232	15581	15581	15591	5135	6237	3895
Chile	2550	3911	4125	4214	17183	13793	1979	1339	1384	2491	6227	6227	6237	2052	2496	1557
China	4001	3700	3902	3987	21466	17232	3111	2015	2082	3748	9369	9369	9379	3088	3753	2342
Christmas Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Cocos Islnds	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Colombia	4985	5905	6228	6364	20080	16119	3878	1754	1812	3262	8154	8154	8164	2687	3267	2039
Comoros	5443	3295	3476	3551	20512	16466	4236	2100	2170	3906	9766	9766	9776	3219	3911	2441
Congo	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Congo, D.R.	15630	10598	11179	11424	26938	21626	12181	3129	3234	5821	14552	14552	14562	4796	5826	3638
Cook Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Costa Rica	3959	5211	5496	5616	18343	14724	3078	1599	1652	2973	7434	7434	7444	2450	2978	1858
Cote d'Ivoire	11605	14105	14878	15204	21927	17602	9042	2682	2771	4988	12471	12471	12481	4110	4993	3118
Croatia	3432	4923	5192	5306	18267	14663	2667	1455	1504	2707	6768	6768	6778	2231	2712	1692
Cuba	5443	6607	6969	7121	20930	16802	4236	2119	2190	3942	9854	9854	9864	3248	3947	2464
Cyprus	6059	7063	7450	7613	21086	16927	4716	1806	1866	3358	8396	8396	8406	2767	3363	2099
Czech Republic	2213	3826	4036	4124	16878	13548	1716	1342	1387	2497	6242	6242	6252	2057	2502	1561
Denmark	1122	3276	3456	3531	13348	10714	865	694	717	1291	3228	3228	3238	1064	1296	807
Djibouti	10225	3295	3476	3551	21387	17169	7966	2525	2609	4696	11740	11740	11750	3869	4701	2935
Dominica	7214	10105	10658	10892	21847	17538	5617	2248	2323	4182	10455	10455	10465	3446	4187	2614
Dominican Republic	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Ecuador	9284	11836	12484	12758	25157	20195	7232	2359	2438	4388	10969	10969	10979	3615	4393	2742
Egypt	2920	6846	7221	7379	26840	21547	2268	1607	1661	2990	7474	7474	7484	2463	2995	1868
El Salvador	5507	7297	7696	7865	21458	17226	4285	1750	1808	3255	8138	8138	8148	2682	3260	2035
EquatorialGuinea	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Eritrea	14997	6225	6565	6709	24295	19504	11688	2822	2916	5248	13121	13121	13131	4324	5253	3280
Estonia	3913	6552	6911	7062	21077	16920	3042	1574	1626	2927	7319	7319	7329	2412	2932	1830
Ethiopia	13006	7692	8113	8290	25359	20358	10135	2691	2781	5006	12515	12515	12525	4125	5011	3129
Faeroe Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Falkland Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Fiji	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Finland	2552	6252	6595	6739	16359	13131	1981	983	1016	1828	4570	4570	4580	1506	1833	1143
France	1031	2845	3001	3066	13205	10599	795	660	682	1228	3070	3070	3080	1012	1233	767
French Guiana	10104	8275	8729	8920	20638	16567	7871	2567	2653	4775	11938	11938	11948	3935	4780	2985

Product codes	020900	021011	021012	021019	021020	021090	030510	040110	040120	040130	040210	040221	040229	040291	040299	040310
French Polynesia	1686	4919	5189	5302	16010	12851	1305	821	848	1526	3816	3816	3826	1258	1531	954
French Southern Ant. Teritory	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Gabon	4375	5272	5561	5682	18713	15022	3403	1661	1717	3090	7726	7726	7736	2546	3095	1931
Gambia	9199	8976	9467	9675	21542	17293	7165	2463	2545	4581	11453	11453	11463	3775	4586	2863
Georgia	7034	4442	4685	4787	24066	19320	5476	2247	2322	4180	10451	10451	10461	3444	4185	2613
Germany	1138	3099	3269	3339	13246	10632	877	693	716	1289	3222	3222	3232	1062	1294	805
Ghana	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Gibraltar	3080	114	120	122	6076	16789	2392	1890	1953	3516	8791	8791	8801	261	3521	2198
Greece	5033	7366	7770	7940	21750	17460	3916	1608	1662	2991	7479	7479	7489	2465	2996	1870
Greenland	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Grenada	2984	4653	4908	5015	18246	14646	2317	1433	1481	2666	6664	6664	6674	2196	2671	1666
Guadeloupe	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Guatemala	4394	10640	11222	11468	25323	20329	3418	2007	2074	3733	9332	9332	9342	3076	3738	2333
Guinea	6976	7711	8134	8312	20916	16790	5432	2258	2333	4200	10499	10499	10509	3460	4205	2625
Guineabissau	10040	7576	7991	8166	21473	17238	7822	2529	2614	4704	11761	11761	11771	3876	4709	2940
Guyana	9020	3295	3476	3551	21166	16992	7026	2418	2498	4497	11242	11242	11252	3705	4502	2811
Haiti	12292	6922	7301	7461	21965	17633	9578	2727	2818	5072	12679	12679	12689	4179	5077	3170
Honduras	9308	5998	6327	6465	21361	17148	7250	2263	2339	4210	10524	10524	10534	3469	4215	2631
Hong Kong	1686	4919	5189	5302	16010	12851	1305	821	848	1526	3816	3816	3826	1258	1531	954
Hungary	2284	4070	4293	4386	17555	14092	1771	1357	1402	2523	6308	6308	6318	2079	2528	1577
Iceland	1686	4919	5189	5302	16010	12851	1305	821	848	1526	3816	3816	3826	1258	1531	954
India	10909	11048	11653	11909	24501	19669	8499	2529	2614	4705	11762	11762	11772	3877	4710	2941
Indonesia	11136	6714	7081	7236	22807	18309	8676	2289	2365	4257	10642	10642	10652	3507	4262	2660
Iran	6684	13338	14069	14377	26892	21589	5203	2236	2311	4159	10399	10399	10409	3427	4164	2600
Iraq	14866	24236	25564	26125	26880	21579	11585	2743	2835	5103	12757	12757	12767	4204	5108	3189
Ireland	1177	2963	3125	3193	12938	10384	908	696	719	1294	3235	3235	3245	1066	1299	809
Israel	6980	11298	11917	12179	26411	21203	5434	2144	2216	3988	9970	9970	9980	3286	3993	2492
Italy	2112	5075	5353	5470	16357	13130	1637	818	846	1522	3805	3805	3815	1254	1527	951
Jamaica	7731	7106	7495	7659	21004	16861	6020	2200	2273	4091	10228	10228	10238	3371	4096	2557
Japan	2633	5974	6301	6439	16255	13048	2044	1066	1101	1982	4956	4956	4966	1633	1987	1239
Jordan	16521	12681	13375	13669	24670	19805	12876	2147	2219	3993	9984	9984	9994	3290	3998	2496
Kazakstan	8778	9210	9714	9927	32299	25931	6837	2066	2135	3843	9608	9608	9618	3167	3848	2402
Kenya	10426	7540	7953	8127	21794	17496	8122	2390	2469	4445	11111	11111	11121	3662	4450	2778
Kiribati	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
North Korea	3680	6800	7172	7329	20255	16260	2860	1565	1617	2911	7276	7276	7286	2398	2916	1819
South Korea	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Kuwait	1686	4919	5189	5302	16010	12851	1305	821	848	1526	3816	3816	3826	1258	1531	954
Kyrgyzstan	7784	22750	23997	24524	21871	17558	6061	2285	2361	4250	10626	10626	10636	3502	4255	2656
Laos	6273	4021	4241	4333	20678	16600	4883	2153	2225	4005	10013	10013	10023	3300	4010	2503
Latvia	3567	6229	6570	6714	20010	16063	2773	1582	1635	2943	7359	7359	7369	2425	2948	1840
Lebanon	5024	6507	6864	7014	18930	15196	3908	1697	1753	3156	7890	7890	7900	2600	3161	1972
Liberia	5024	218	230	234	5729	15828	3908	1697	1753	3156	7890	7890	7900	234	3161	1972
Libya	11039	9119	9618	9829	25844	20747	8601	2673	2762	4972	12431	12431	12441	4097	4977	3108
Lithuania	4178	4150	4377	4472	21130	16962	3249	2013	2080	3745	9362	9362	9372	3086	3750	2340
Macau	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Macedonia	2821	5300	5590	5712	18686	15000	2190	1462	1510	2719	6797	6797	6807	2240	2724	1699
Madagascar	12975	12034	12693	12972	22136	17770	10110	2733	2824	5084	12709	12709	12719	4189	5089	3177
Malawi	9994	7069	7456	7619	21370	17155	7785	2283	2359	4247	10616	10616	10626	3499	4252	2654
Malaysia	9587	8644	9117	9317	22041	17694	7468	2098	2168	3902	9755	9755	9765	3215	3907	2439
Maldives	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Mali	10381	8609	9080	9279	21643	17374	8087	2407	2487	4477	11191	11191	11201	3688	4482	2798
Malta	2383	4047	4269	4362	17496	14044	1849	1353	1399	2517	6293	6293	6303	2074	2522	1573
Marshall Islands	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Martinique	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Mauritania	35054	21901	23101	23608	32748	26291	27324	4683	4839	8711	21777	21777	21787	7177	8716	5444
Mauritius	2654	4254	4486	4584	18135	14558	2060	1398	1445	2600	6501	6501	6511	2143	2605	1625
Mexico	3611	5945	6270	6407	21291	17091	2806	1620	1674	3013	7532	7532	7542	2482	3018	1883
Micronesia	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Moldova	5839	4223	4454	4551	21640	17372	4545	2151	2223	4001	10003	10003	10013	3297	4006	2501
Mongolia	16581	3295	3476	3551	22116	17754	12923	2294	2370	4267	10667	10667	10677	3516	4272	2667
Montserrat	8142	3295	3476	3551	21006	16862	6341	2340	2418	4352	10880	10880	10890	3586	4357	2720
Morocco	18548	18143	19137	19557	27051	21717	14457	3780	3906	7031	17577	17577	17587	5793	7036	4394
Mozambique	7612	5956	6282	6419	20901	16779	5928	2156	2228	4011	10028	10028	10038	3305	4016	2507
Myanmar	10536	7149	7540	7705	23484	18853	8208	2510	2594	4669	11673	11673	11683	3847	4674	2918
N.Caledonia	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
N.Mariana	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Nauru	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Nepal	10810	5452	5751	5876	23869	19161	8422	2515	2599	4677	11693	11693	11703	3854	4682	2923
Netherlands Antilles	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Netherlands	1185	3061	3229	3299	13091	10507	914	705	729	1312	3279	3279	3289	1081	1317	820
New Zealand	5370	5511	5812	5939	17985	14437	4179	1848	1909	3436	8591	8591	8601	2831	3441	2148
Nicaragua	9902	5480	5780	5907	22998	18462	7713	2505	2589	4660	11650	11650	11660	3840	4665	2913
Niger	16299	32604	34390	35146	26570	21330	12703	3157	3263	5873	14682	14682	14692	4839	5878	3670
Nigeria	16119	12052	12712	12991	22484	18049	12563	2809	2902	5224	13061	13061	13071	4305	5229	3265

Product codes	020900	021011	021012	021019	021020	021090	030510	040110	040120	040130	040210	040221	040229	040291	040299	040310
Niue	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Norfolk Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Norway	1364	4953	5224	5338	16091	12916	1054	782	808	1455	3636	3636	3646	1199	1460	909
Oman	6970	13478	14217	14528	30286	24315	5427	2329	2407	4333	10831	10831	10841	3570	4338	2708
Pakistan	10081	15504	16354	16712	24896	19986	7853	2548	2633	4740	11849	11849	11859	3905	4745	2962
Palau	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Panama	8814	8440	8902	9097	20339	16327	6865	2145	2216	3990	9974	9974	9984	3287	3995	2493
Papua New Guinea	3597	3159	3332	3404	20170	16191	2796	1936	2000	3600	9001	9001	9011	2967	3605	2250
Paraguay	5709	9715	10247	10471	22668	18197	4443	1902	1965	3537	8843	8843	8853	2914	3542	2211
Peru	6775	9209	9714	9926	24161	19396	5275	2065	2134	3840	9601	9601	9611	3164	3845	2400
Philippines	6793	6027	6357	6496	20798	16696	5288	2206	2279	4103	10258	10258	10268	3381	4108	2564
Pitcairn	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Poland	2580	3755	3961	4047	17325	13907	2003	1377	1423	2561	6402	6402	6412	2110	2566	1600
Portugal	5178	7720	8142	8320	25860	20761	4029	1729	1786	3215	8038	8038	8048	2649	3220	2010
Qatar	2797	4536	4784	4888	18568	14905	2172	1393	1440	2592	6479	6479	6489	2135	2597	1620
Reunion	3173	4934	5204	5317	18716	15024	2465	1483	1532	2758	6896	6896	6906	2273	2763	1724
Romania	3253	5389	5684	5808	19086	15321	2527	1506	1556	2801	7003	7003	7013	2308	2806	1751
Russia	6041	8784	9265	9468	22306	17907	4702	1911	1975	3555	8887	8887	8897	2929	3560	2222
Rwanda	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
South Africa	6468	12852	13556	13853	27423	22015	5035	2213	2287	4117	10292	10292	10302	3392	4122	2573
St.Vincent-Grenadine	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Samoa	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Sao Tome Prncipe	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Saudi Arabia	5328	7291	7691	7859	19360	15541	4146	1826	1887	3396	8489	8489	8499	2798	3401	2122
Senegal	9029	7849	8279	8461	21362	17149	7033	2441	2523	4541	11352	11352	11362	3742	4546	2838
Seychelles	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Sierra Leone	7403	6959	7340	7500	20973	16836	5764	2292	2368	4263	10658	10658	10668	3513	4268	2665
Singapore	3996	9007	9500	9709	19194	15408	3107	1242	1283	2310	5774	5774	5784	1903	2315	1444
Slovakia	2992	5019	5294	5410	17920	14385	2323	1472	1521	2738	6845	6845	6855	2256	2743	1711
Slovenia	2580	4214	4444	4541	18111	14538	2002	1386	1433	2579	6447	6447	6457	2125	2584	1612
Solomon Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Somalia	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Spain	2464	4480	4725	4828	20389	16368	1912	1401	1448	2606	6516	6516	6526	2147	2611	1629
Spec Cats	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Sri Lanka	9518	10641	11224	11470	21704	17423	7414	2478	2560	4608	11521	11521	11531	3797	4613	2880
St. Helena	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
St. Kitts Nev	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
St. Lucia	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
St. Pier. Miqu	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Sudan	16772	9569	10093	10314	22605	18147	13072	2937	3035	5462	13655	13655	13665	4501	5467	3414
Suriname	8755	8264	8717	8908	20183	16202	6819	2301	2377	4279	10698	10698	10708	3526	4284	2675
Sweden	1204	3879	4091	4180	14220	11414	929	739	763	1374	3435	3435	3445	1132	1379	859
Switzerland-Liechnstine	1113	3497	3688	3769	14966	12013	858	682	705	1268	3171	3171	3181	1045	1273	793
Syria	12602	17806	18782	19194	35760	28710	9820	3433	3547	6385	15963	15963	15973	5261	6390	3991
Taiwan	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Tajikistan	9724	11690	12330	12601	22384	17969	7575	2309	2386	4295	10737	10737	10747	3539	4300	2684
Tanzania	14507	9715	10247	10471	22597	18140	11305	2707	2797	5035	12586	12586	12596	4148	5040	3147
Thailand	7402	9429	9945	10163	24994	20065	5763	1941	2006	3610	9026	9026	9036	2975	3615	2256
Togo	10251	8809	9292	9495	21822	17518	7986	2290	2366	4259	10649	10649	10659	3510	4264	2662
Tokelau	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Tonga	2383	4068	4290	4384	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
Trinidad Tobago	4869	5807	6124	6258	18890	15163	3788	1742	1800	3240	8100	8100	8110	2669	3245	2025
Tunisia	4417	19275	20331	20777	68292	54832	3435	2018	2085	3754	9384	9384	9394	3093	3759	2346
Turkey	2962	4750	5010	5119	18868	15146	2301	1401	1448	2606	6514	6514	6524	2147	2611	1628
Turkmenistan	8310	7961	8397	8580	33566	26948	6471	3138	3243	5837	14592	14592	14602	4809	5842	3648
Turks Caicos Island	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Tuvalu	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Uganda	10523	5398	5693	5817	21549	17299	8198	2437	2519	4533	11333	11333	11343	3735	4538	2833
Ukraine	7911	6849	7224	7382	22273	17880	6160	2295	2371	4268	10671	10671	10681	3517	4273	2668
United Arab Emirates	11585	12375	13052	13339	21262	17068	9026	1748	1806	3251	8127	8127	8137	2679	3256	2032
United Kingdom	1018	3093	3262	3333	13232	10620	784	692	715	1286	3216	3216	3226	1060	1291	804
Uruguay	3621	6259	6602	6746	23319	18720	2814	1558	1610	2898	7244	7244	7254	2388	2903	1811
US Msc.Pacific	2383	4107	4332	4426	18044	14485	1849	1356	1401	2521	6303	6303	6313	2077	2526	1576
USA	1684	4942	5212	5326	17155	13770	1304	803	829	1493	3732	3732	3742	1230	1498	933
Uzbekistan	6232	5869	6190	6325	22955	18428	4851	2286	2363	4253	10632	10632	10642	3504	4258	2658
Vanuatu	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Venezuela	11643	9668	10198	10421	24905	19993	9072	2125	2196	3952	9880	9880	9890	3256	3957	2470
Viet Nam	6356	4725	4984	5093	23768	19080	4947	2366	2445	4401	11003	11003	11013	3626	4406	2751
Wallis Futuna Islands	3080	3295	3476	3551	20079	16118	2392	1890	1953	3516	8791	8791	8801	2897	3521	2198
Yemen	10826	6058	6390	6529	23641	18979	8435	2583	2669	4804	12011	12011	12021	3959	4809	3003
Yugoslavia	3879	5391	5687	5811	19503	15656	3016	1565	1617	2911	7277	7277	7287	2398	2916	1819
Zambia	8142	8923	9411	9617	25161	20199	6340	2668	2757	4962	12405	12405	12415	4088	4967	3101
Zimbabe	6345	8381	8840	9034	22357	17948	4939	2328	2406	4330	10825	10825	10835	3568	4335	2706
Global average	**1649**	**4132**	**4203**	**3697**	**17147**	**13291**	**3047**	**772**	**820**	**1464**	**4890**	**5121**	**6027**	**1165**	**2060**	**934**

Product codes	040390	040410	040490	040610	040620	040630	040640	040690	040700	040811	040819	040891	040899	041000	050100	050210
Afghanistan	3940	1403	2798	8092	12829	12829	12829	12829	9188	22982	18386	13613	10210	12896	8753	8753
Albania	3630	1293	2577	7455	11819	11819	11819	11819	6831	17090	13672	10122	7591	12652	20591	20591
Algeria	4081	1453	2897	8380	13285	13285	13285	13285	10358	25908	20726	15347	11510	14267	27102	27102
Andorra	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Angola	4346	1548	3086	8925	14148	14148	14148	14148	12531	31339	25071	18565	13924	12148	7039	7039
Anguilla	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Antigua Barbuda	3211	1144	2280	6595	10458	10458	10458	10458	5231	13090	10472	7751	5813	10695	13241	13241
Argentina	2431	866	1726	4994	7922	7922	7922	7922	2505	6275	5020	3712	2784	10884	10868	10868
Armenia	3458	1231	2455	7101	11259	11259	11259	11259	4848	12133	9707	7184	5388	12235	8457	8457
Aruba	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Australia	1932	688	1372	3968	6298	6298	6298	6298	1915	4799	3839	2838	2129	11055	19157	19157
Austria	1136	404	806	2332	3708	3708	3708	3708	714	1797	1438	1059	794	7566	7233	7233
Azerbaijan	3761	1340	2671	7725	12246	12246	12246	12246	5465	13675	10940	8097	6073	13018	43026	43026
Bahamas	3426	1220	2433	7036	11156	11156	11156	11156	4408	11033	8826	6532	4899	13065	20491	20491
Bahrain	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Bangladesh	4543	1618	3226	9331	14790	14790	14790	14790	9577	23954	19164	14189	10642	14648	13640	13640
Barbados	2767	986	1965	5683	9015	9015	9015	9015	3781	9465	7572	5603	4202	10374	11705	11705
Belarus	2800	997	1988	5750	9120	9120	9120	9120	3876	9702	7761	5743	4307	11141	14193	14193
Belgium-Luxembourg	1099	391	780	2256	3588	3588	3588	3588	721	1814	1452	1069	802	7232	5753	5753
Belize	3010	1072	2137	6182	9804	9804	9804	9804	4787	11981	9584	7094	5320	10607	13814	13814
Benin	4205	1498	2986	8637	13691	13691	13691	13691	10376	25952	20762	15373	11530	11995	18570	18570
Bermuda	3685	1313	2617	7569	11999	11999	11999	11999	5649	14136	11309	8371	6278	12767	9655	9655
Bhutan	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Bolivia	4094	1458	2907	8408	13328	13328	13328	13328	8670	21687	17349	12845	9634	13986	12439	12439
Bosnia Herzegovina	3177	1131	2256	6524	10346	10346	10346	10346	3478	8707	6966	5154	3865	10931	7018	7018
British indian ocean territory	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
British virgin islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Brazil	2741	976	1946	5630	8930	8930	8930	8930	3598	9007	7206	5332	3999	12376	15657	15657
Brunei	1344	478	954	2759	4385	4385	4385	4385	1053	2645	2116	1561	1171	8852	10517	10517
Bulgaria	2678	954	1901	5499	8723	8723	8723	8723	3669	9185	7348	5437	4078	10441	12703	12703
Burkina Faso	4436	1580	3150	9111	14442	14442	14442	14442	11458	28658	22926	16976	12732	12155	28956	28956
Burundi	4475	1594	3177	9190	14567	14567	14567	14567	15469	38684	30947	22918	17189	12395	13991	13991
Cambodia	3671	1307	2606	7539	11952	11952	11952	11952	6711	16789	13431	9943	7457	11600	7176	7176
Cameroon	3755	1337	2666	7712	12227	12227	12227	12227	8930	22337	17870	13231	9923	11726	12603	12603
Canada	1311	467	931	2693	4279	4279	4279	4279	1095	2751	2201	1624	1218	9083	10258	10258
Cape Verde	7907	2816	5615	16240	25728	25728	25728	25728	20571	51440	41152	30477	22858	14090	34366	34366
Cayman Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Centtral African Republic	3761	1340	2671	7725	12247	12247	12247	12247	7177	17956	14365	10635	7976	11591	12128	12128
Chad	5486	1954	3895	11266	17854	17854	17854	17854	20368	50934	40747	30177	22633	13167	28301	28301
Chile	2193	781	1557	4503	7145	7145	7145	7145	2130	5338	4271	3158	2368	9501	8357	8357
China	3299	1175	2342	6775	10742	10742	10742	10742	3806	9528	7623	5641	4230	11870	7905	7905
Christmas Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Cocos Islnds	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Colombia	2871	1022	2039	5896	9351	9351	9351	9351	4174	10448	8358	6186	4639	11103	12627	12627
Comoros	3438	1225	2441	7062	11197	11197	11197	11197	5182	12969	10375	7679	5759	11342	7039	7039
Congo	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Congo, D.R.	5124	1825	3638	10522	16676	16676	16676	16676	14901	37265	29812	22077	16558	14897	22677	22677
Cook Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Costa Rica	2617	932	1858	5375	8526	8526	8526	8526	3314	8297	6637	4911	3683	10142	11140	11140
Cote d'Ivoire	4391	1564	3118	9017	14293	14293	14293	14293	11061	27664	22131	16388	12291	12125	30185	30185
Croatia	2383	849	1692	4894	7764	7764	7764	7764	2871	7191	5753	4255	3191	10100	10524	10524
Cuba	3470	1236	2464	7126	11298	11298	11298	11298	5182	12968	10374	7679	5759	11574	14130	14130
Cyprus	2956	1053	2099	6071	9628	9628	9628	9628	5076	12702	10161	7521	5641	11660	15107	15107
Czech Republic	2198	783	1561	4514	7163	7163	7163	7163	1848	4632	3706	2739	2054	9332	8177	8177
Denmark	1136	405	807	2334	3711	3711	3711	3711	698	1758	1406	1036	777	7380	6999	6999
Djibouti	4133	1472	2935	8489	13456	13456	13456	13456	9745	24374	19500	14438	10829	11826	7039	7039
Dominica	3681	1311	2614	7560	11986	11986	11986	11986	6046	15126	12101	8958	6718	12081	21620	21620
Dominican Republic	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Ecuador	3862	1375	2742	7932	12574	12574	12574	12574	7783	19470	15576	11532	8649	13911	25326	25326
Egypt	2631	937	1868	5404	8573	8573	8573	8573	2441	6115	4892	3618	2713	14842	14642	14642
El Salvador	2865	1020	2035	5884	9333	9333	9333	9333	4612	11543	9235	6834	5126	11866	15608	15608
EquatorialGuinea	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Eritrea	4620	1645	3280	9487	15037	15037	15037	15037	14298	35757	28605	21183	15887	13435	13311	13311
Estonia	2577	918	1830	5292	8395	8395	8395	8395	3275	8200	6560	4853	3640	11655	14013	14013
Ethiopia	4406	1569	3129	9049	14344	14344	14344	14344	12398	31006	24805	18368	13776	14023	16453	16453
Faeroe Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Falkland Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Fiji	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Finland	1609	573	1143	3305	5248	5248	5248	5248	1598	4008	3206	2369	1777	9045	13371	13371
France	1081	385	767	2220	3530	3530	3530	3530	641	1616	1293	952	714	7301	6076	6076
French Guiana	4203	1497	2985	8632	13684	13684	13684	13684	8471	21190	16952	12551	9414	11412	17703	17703

Product codes	040390	040410	040490	040610	040620	040630	040640	040690	040700	040811	040819	040891	040899	041000	050100	050210
French Polynesia	1344	478	954	2759	4385	4385	4385	4385	1053	2645	2116	1561	1171	8852	10517	10517
French Southern Ant. Teritory	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Gabon	2720	969	1931	5586	8861	8861	8861	8861	3663	9169	7335	5428	4071	10348	11273	11273
Gambia	4032	1436	2863	8281	13128	13128	13128	13128	8766	21928	17542	12988	9741	11912	19202	19202
Georgia	3679	1310	2613	7557	11980	11980	11980	11980	6700	16762	13410	9927	7445	13308	9494	9494
Germany	1134	404	805	2330	3704	3704	3704	3704	708	1783	1426	1051	788	7324	6619	6619
Ghana	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Gibraltar	279	463	2198	2669	4241	4241	4241	4241	3341	8922	6692	4951	3713	3358	228	228
Greece	2633	938	1870	5408	8578	8578	8578	8578	4215	10550	8440	6246	4684	12027	15756	15756
Greenland	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Grenada	2346	836	1666	4819	7646	7646	7646	7646	2495	6249	4999	3697	2773	10089	9947	9947
Guadeloupe	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Guatemala	3286	1170	2333	6748	10700	10700	10700	10700	3679	9209	7367	5451	4089	14003	22765	22765
Guinea	3697	1317	2625	7592	12036	12036	12036	12036	6645	16626	13300	9846	7385	11566	16495	16495
Guineabissau	4141	1475	2940	8504	13481	13481	13481	13481	9568	23934	19147	14177	10633	11874	16205	16205
Guyana	3958	1410	2811	8129	12887	12887	12887	12887	8595	21500	17200	12735	9551	11704	7039	7039
Haiti	4464	1590	3170	9168	14532	14532	14532	14532	11716	29303	23443	17359	13019	12146	14806	14806
Honduras	3705	1320	2631	7610	12065	12065	12065	12065	8869	22186	17749	13141	9856	11812	12827	12827
Hong Kong	1344	478	954	2759	4385	4385	4385	4385	1053	2645	2116	1561	1171	8852	10517	10517
Hungary	2221	791	1577	4562	7238	7238	7238	7238	1907	4780	3824	2827	2120	9707	8698	8698
Iceland	1344	478	954	2759	4385	4385	4385	4385	1053	2645	2116	1561	1171	8852	10517	10517
India	4141	1475	2941	8505	13482	13482	13482	13482	10397	26006	20805	15405	11554	13549	23639	23639
Indonesia	3747	1334	2660	7695	12199	12199	12199	12199	10614	26547	21238	15726	11794	12612	14359	14359
Iran	3661	1304	2600	7519	11921	11921	11921	11921	5600	14014	11211	8298	6224	14871	28543	28543
Iraq	4492	1600	3189	9224	14621	14621	14621	14621	12468	31182	24946	18472	13854	14864	51878	51878
Ireland	1139	406	809	2339	3719	3719	3719	3719	733	1844	1475	1087	815	7153	6327	6327
Israel	3510	1250	2492	7209	11430	11430	11430	11430	5849	14635	11708	8667	6500	14605	24176	24176
Italy	1340	477	951	2751	4372	4372	4372	4372	1321	3314	2651	1958	1469	9044	10850	10850
Jamaica	3601	1283	2557	7396	11726	11726	11726	11726	6479	16210	12968	9600	7200	11614	15199	15199
Japan	1745	621	1239	3583	5690	5690	5690	5690	1649	4134	3307	2444	1833	8987	12775	12775
Jordan	3515	1252	2496	7219	11446	11446	11446	11446	13857	34655	27724	20530	15398	13642	27135	27135
Kazakstan	3383	1205	2402	6947	11016	11016	11016	11016	7358	18408	14727	10903	8177	17862	19704	19704
Kenya	3912	1393	2778	8034	12737	12737	12737	12737	9936	24853	19883	14722	11041	12051	16128	16128
Kiribati	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
North Korea	2562	912	1819	5261	8346	8346	8346	8346	3079	7710	6168	4563	3422	11200	14544	14544
South Korea	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Kuwait	1344	478	954	2759	4385	4385	4385	4385	1053	2645	2116	1561	1171	8852	10517	10517
Kyrgyzstan	3741	1332	2656	7683	12181	12181	12181	12181	7416	18551	14841	10988	8241	12094	48697	48697
Laos	3525	1256	2503	7240	11480	11480	11480	11480	5974	14949	11959	8853	6639	11434	8592	8592
Latvia	2591	923	1840	5321	8441	8441	8441	8441	2985	7474	5979	4423	3317	11065	13321	13321
Lebanon	2778	989	1972	5705	9049	9049	9049	9049	4207	10530	8424	6234	4675	10467	13917	13917
Liberia	250	415	1972	2395	3808	3808	3808	3808	4712	12577	9433	6981	5236	3166	450	450
Libya	4377	1559	3108	8989	14248	14248	14248	14248	10521	26316	21053	15589	11692	14291	19508	19508
Lithuania	3296	1174	2340	6769	10734	10734	10734	10734	3975	9950	7960	5890	4418	11684	8868	8868
Macau	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Macedonia	2393	852	1699	4914	7797	7797	7797	7797	2358	5907	4725	3494	2621	10332	11331	11331
Madagascar	4475	1594	3177	9190	14567	14567	14567	14567	12368	30933	24746	18325	13743	12241	25751	25751
Malawi	3738	1331	2654	7677	12170	12170	12170	12170	9524	23823	19059	14112	10584	11817	15120	15120
Malaysia	3434	1223	2439	7053	11184	11184	11184	11184	8037	20105	16084	11908	8931	12188	18492	18492
Maldives	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Mali	3940	1403	2798	8092	12828	12828	12828	12828	9894	24747	19797	14659	10994	11968	18417	18417
Malta	2216	789	1573	4551	7221	7221	7221	7221	1990	4989	3991	2950	2213	9674	8650	8650
Marshall Islands	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Martinique	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Mauritania	7667	2731	5444	15746	24948	24948	24948	24948	33433	83595	66876	49532	37149	18110	46879	46879
Mauritius	2289	815	1625	4701	7459	7459	7459	7459	2218	5557	4446	3287	2465	10028	9091	9091
Mexico	2652	944	1883	5446	8639	8639	8639	8639	3021	7565	6052	4477	3358	11773	12712	12712
Micronesia	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Moldova	3522	1254	2501	7233	11468	11468	11468	11468	5560	13914	11131	8239	6179	11966	9026	9026
Mongolia	3756	1338	2667	7713	12228	12228	12228	12228	15808	39533	31626	23421	17566	12229	7039	7039
Montserrat	3831	1364	2720	7867	12472	12472	12472	12472	7757	19405	15524	11494	8620	11615	7039	7039
Morocco	6189	2204	4394	12710	20139	20139	20139	20139	15558	38908	31127	23051	17288	14959	38831	38831
Mozambique	3531	1257	2507	7251	11496	11496	11496	11496	7252	18142	14514	10745	8059	11558	12736	12736
Myanmar	4110	1464	2918	8441	13380	13380	13380	13380	10041	25115	20092	14877	11158	12986	15291	15291
N.Caledonia	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
N.Mariana	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Nauru	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Nepal	4117	1466	2923	8455	13403	13403	13403	13403	10303	25769	20615	15265	11448	13199	11658	11658
Netherlands Antilles	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Netherlands	1154	411	820	2371	3770	3770	3770	3770	738	1857	1485	1094	821	7238	6538	6538
New Zealand	3025	1077	2148	6212	9851	9851	9851	9851	4498	11257	9005	6665	4999	9945	11783	11783
Nicaragua	4102	1461	2913	8424	13354	13354	13354	13354	9436	23603	18882	13981	10486	12717	11718	11718
Niger	5169	1841	3670	10616	16824	16824	16824	16824	15539	38861	31088	23023	17267	14693	69795	69795
Nigeria	4598	1638	3265	9444	14969	14969	14969	14969	15368	38432	30745	22768	17076	12433	25789	25789

Product codes	040390	040410	040490	040610	040620	040630	040640	040690	040700	040811	040819	040891	040899	041000	050100	050210
Niue	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Norfolk Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Norway	1280	456	909	2629	4179	4179	4179	4179	850	2138	1711	1261	946	8897	10588	10588
Oman	3814	1358	2708	7832	12416	12416	12416	12416	5841	14614	11691	8654	6491	16749	28843	28843
Pakistan	4172	1486	2962	8568	13582	13582	13582	13582	9607	24030	19224	14234	10676	13767	33181	33181
Palau	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Panama	3512	1251	2493	7212	11435	11435	11435	11435	7388	18483	14786	10947	8210	11247	18055	18055
Papua New Guinea	3169	1129	2250	6508	10321	10321	10321	10321	3421	8566	6853	5070	3803	11153	6748	6748
Paraguay	3113	1109	2211	6394	10140	10140	10140	10140	4782	11968	9575	7086	5315	12535	20785	20785
Peru	3380	1204	2400	6942	11008	11008	11008	11008	5677	14205	11364	8412	6309	13360	19702	19702
Philippines	3612	1286	2564	7417	11760	11760	11760	11760	6470	16187	12950	9586	7190	11501	12889	12889
Pitcairn	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Poland	2254	803	1600	4629	7345	7345	7345	7345	2156	5403	4322	3196	2397	9580	8024	8024
Portugal	2830	1008	2010	5812	9219	9219	9219	9219	4337	10855	8684	6426	4820	14300	16512	16512
Qatar	2281	812	1620	4685	7434	7434	7434	7434	2338	5858	4686	3465	2599	10267	9696	9696
Reunion	2428	865	1724	4986	7911	7911	7911	7911	2654	6647	5317	3933	2950	10349	10548	10548
Romania	2466	878	1751	5063	8033	8033	8033	8033	2721	6814	5451	4032	3024	10553	11522	11522
Russia	3129	1114	2222	6426	10190	10190	10190	10190	5061	12664	10131	7499	5624	12335	18793	18793
Rwanda	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
South Africa	3624	1291	2573	7442	11799	11799	11799	11799	5419	13560	10848	8030	6022	15165	27502	27502
St.Vincent-Grenadine	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Samoa	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Sao Tome Prncipe	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Saudi Arabia	2989	1065	2122	6139	9735	9735	9735	9735	4462	11168	8934	6612	4959	10705	15596	15596
Senegal	3997	1424	2838	8209	13013	13013	13013	13013	8604	21522	17217	12748	9561	11812	16791	16791
Seychelles	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Sierra Leone	3753	1336	2665	7707	12218	12218	12218	12218	7052	17643	14114	10449	7837	11597	14884	14884
Singapore	2033	724	1444	4175	6626	6626	6626	6626	2506	6278	5023	3715	2786	10613	19270	19270
Slovakia	2410	858	1711	4949	7852	7852	7852	7852	2501	6266	5012	3707	2780	9909	10731	10731
Slovenia	2270	808	1612	4662	7397	7397	7397	7397	2156	5401	4321	3195	2396	10014	9005	9005
Solomon Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Somalia	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Spain	2294	817	1629	4711	7475	7475	7475	7475	2059	5160	4128	3052	2289	11274	9576	9576
Spec Cats	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Sri Lanka	4056	1445	2880	8330	13206	13206	13206	13206	9070	22687	18149	13438	10078	12002	22768	22768
St. Helena	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
St. Kitts Nev	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
St. Lucia	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
St. Pier. Miqu	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Sudan	4808	1712	3414	9874	15649	15649	15649	15649	15991	39989	31991	23691	17769	12500	20473	20473
Suriname	3767	1341	2675	7736	12264	12264	12264	12264	7339	18360	14688	10874	8155	11161	17679	17679
Sweden	1209	431	859	2484	3948	3948	3948	3948	750	1887	1510	1112	834	7862	8288	8288
Switzerland-Liechnstine	1116	398	793	2293	3646	3646	3646	3646	693	1744	1395	1027	771	8275	7471	7471
Syria	5620	2002	3991	11543	18292	18292	18292	18292	12013	30044	24035	17798	13348	19776	38111	38111
Taiwan	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
Tajikistan	3780	1346	2684	7764	12308	12308	12308	12308	9267	23179	18543	13730	10297	12378	25014	25014
Tanzania	4431	1578	3147	9101	14426	14426	14426	14426	13829	34586	27669	20490	15367	12495	20784	20784
Thailand	3178	1132	2256	6526	10349	10349	10349	10349	6203	15519	12415	9191	6893	13821	20173	20173
Togo	3749	1335	2662	7700	12207	12207	12207	12207	9769	24435	19548	14474	10856	12067	18846	18846
Tokelau	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Tonga	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8693	8693
Trinidad Tobago	2852	1016	2025	5857	9289	9289	9289	9289	4077	10205	8164	6042	4531	10445	12417	12417
Tunisia	3304	1177	2346	6785	10759	10759	10759	10759	3698	9257	7406	5480	4110	37769	41256	41256
Turkey	2293	817	1628	4710	7473	7473	7473	7473	2477	6204	4963	3671	2753	10433	10153	10153
Turkmenistan	5138	1830	3648	10551	16722	16722	16722	16722	7917	19805	15844	11730	8798	18563	17029	17029
Turks Caicos Island	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Tuvalu	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Uganda	3990	1421	2833	8195	12991	12991	12991	12991	10028	25084	20067	14858	11144	11916	11541	11541
Ukraine	3757	1338	2668	7716	12233	12233	12233	12233	7537	18854	15083	11167	8375	12316	14649	14649
United Arab Emirates	2861	1019	2032	5877	9320	9320	9320	9320	7280	18212	14569	10786	8090	11757	26480	26480
United Kingdom	1132	403	804	2325	3698	3698	3698	3698	633	1595	1276	939	704	7315	6605	6605
Uruguay	2551	908	1811	5238	8310	8310	8310	8310	3029	7585	6068	4489	3367	12895	13385	13385
US Msc.Pacific	2219	790	1576	4558	7232	7232	7232	7232	1990	4989	3991	2950	2213	9978	8778	8778
USA	1314	468	933	2698	4288	4288	4288	4288	1052	2642	2114	1560	1170	9485	10564	10564
Uzbekistan	3743	1333	2658	7687	12188	12188	12188	12188	5935	14850	11880	8794	6595	12694	12549	12549
Vanuatu	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Venezuela	3479	1239	2470	7144	11327	11327	11327	11327	9763	24420	19536	14465	10849	13772	20685	20685
Viet Nam	3874	1380	2751	7956	12613	12613	12613	12613	6053	15145	12116	8969	6727	13143	10101	10101
Wallis Futuna Islands	3095	1102	2198	6356	10080	10080	10080	10080	2928	7332	5866	4339	3254	11103	7039	7039
Yemen	4229	1506	3003	8685	13767	13767	13767	13767	10318	25808	20647	15288	11466	13073	12955	12955
Yugoslavia	2562	913	1819	5262	8347	8347	8347	8347	3246	8128	6502	4811	3608	10784	11527	11527
Zambia	4368	1556	3101	8970	14218	14218	14218	14218	7757	19405	15524	11493	8620	13914	19089	19089
Zimbabe	3811	1357	2706	7828	12409	12409	12409	12409	6043	15120	12096	8954	6715	12363	17930	17930
Global average	**1520**	**432**	**920**	**3071**	**4894**	**4678**	**3906**	**4801**	**2083**	**4237**	**2126**	**2110**	**1254**	**10447**	**22392**	**12842**

Product codes	050290	050300	050400	051110	160100	160210	160220	160231	160239	160241	160242	160249	160250	160290	160300	410110
Afghanistan	8753	13696	12896	537781	12896	18721	9012	9641	9641	4096	4096	2072	18721	12896	7510	14283
Albania	20591	13766	12652	527632	12652	18368	8842	7171	7171	9624	9624	4875	18368	12652	5584	14014
Algeria	27102	14865	14267	594980	14267	20712	9970	12352	12352	12665	12665	6416	20712	14267	9625	15802
Andorra	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Angola	7039	13619	12148	506586	12148	17635	8489	13145	13145	3295	3295	1667	17635	12148	10243	13455
Anguilla	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Antigua Barbuda	13241	13676	10695	445999	10695	15526	7474	6244	6244	6192	6192	3135	15526	10695	4860	11846
Argentina	10868	14024	10884	453902	10884	15801	7606	2996	2996	5083	5083	2573	15801	10884	2327	12055
Armenia	8457	13449	12235	510237	12235	17762	8550	5093	5093	3957	3957	2002	17762	12235	3963	13552
Aruba	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Australia	19157	15155	11055	461009	11055	16048	7725	3056	3056	8955	8955	4535	16048	11055	2373	12244
Austria	7233	11512	7566	315504	7566	10983	5287	1147	1147	3386	3386	1712	10983	7566	884	8380
Azerbaijan	43026	14098	13018	542870	13018	18898	9097	5739	5739	20102	20102	10186	18898	13018	4467	14418
Bahamas	20491	14543	13065	544848	13065	18967	9130	5263	5263	9578	9578	4851	18967	13065	4095	14471
Bahrain	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Bangladesh	13640	14400	14648	610874	14648	21266	10237	10049	10049	6378	6378	3229	21266	14648	7828	16225
Barbados	11705	13429	10374	432615	10374	15060	7250	4516	4516	5474	5474	2771	15060	10374	3513	11490
Belarus	14193	13203	11141	464593	11141	16173	7785	4629	4629	6636	6636	3360	16173	11141	3601	12339
Belgium-Luxembourg	5753	11687	7232	301576	7232	10498	5054	1158	1158	2695	2695	1362	10498	7232	893	8010
Belize	13814	13985	10607	442336	10607	15398	7413	5715	5715	6459	6459	3270	15398	10607	4448	11748
Benin	18570	13956	11995	500234	11995	17414	8383	10887	10887	8680	8680	4396	17414	11995	8482	13286
Bermuda	9655	13724	12767	532412	12767	18534	8922	5933	5933	4517	4517	2286	18534	12767	4618	14141
Bhutan	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Bolivia	12439	14124	13986	583241	13986	20304	9774	9098	9098	5817	5817	2945	20304	13986	7087	15491
Bosnia Herzegovina	7018	12824	10931	455866	10931	15869	7639	3657	3657	3285	3285	1661	15869	10931	2842	12108
British indian ocean territory	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
British virgin islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Brazil	15657	15881	12376	516123	12376	17967	8649	4298	4298	7320	7320	3707	17967	12376	3342	13708
Brunei	10517	13167	8852	369164	8852	12851	6186	1686	1686	4919	4919	2490	12851	8852	1305	9805
Bulgaria	12703	13507	10441	435423	10441	15158	7297	4383	4383	5940	5940	3007	15158	10441	3409	11565
Burkina Faso	28956	14051	12155	506904	12155	17646	8495	12021	12021	13531	13531	6855	17646	12155	9366	13463
Burundi	13991	13867	12395	516904	12395	17994	8662	16225	16225	6542	6542	3312	17994	12395	12645	13279
Cambodia	7176	13369	11600	483737	11600	16840	8106	7045	7045	3359	3359	1699	16840	11600	5485	12848
Cameroon	12603	13649	11726	488987	11726	17022	8194	9371	9371	5894	5894	2984	17022	11726	7299	12987
Canada	10258	13506	9083	378799	9083	13187	6348	1753	1753	4798	4798	2428	13187	9083	1358	10061
Cape Verde	34366	16296	14090	587577	14090	20455	9846	24520	24520	16057	16057	8136	20455	14090	19116	15606
Cayman Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Centtral African Republic	12128	13424	11591	483361	11591	16827	8100	7534	7534	5672	5672	2871	16827	11591	5867	12838
Chad	28301	14344	13167	549104	13167	19115	9202	21361	21361	13225	13225	6700	19115	13167	16651	14584
Chile	8357	12889	9501	396210	9501	13793	6640	2550	2550	3911	3911	1978	13793	9501	1979	10523
China	7905	13757	11870	495008	11870	17232	8295	4001	4001	3700	3700	1871	17232	11870	3111	13147
Christmas Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Cocos Islnds	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Colombia	12627	14153	11103	463043	11103	16119	7759	4985	4985	5905	5905	2989	16119	11103	3878	12298
Comoros	7039	13229	11342	472995	11342	16466	7926	5443	5443	3295	3295	1667	16466	11342	4236	12563
Congo	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Congo, D.R.	22677	14980	14897	621230	14897	21626	10410	15630	15630	10598	10598	5369	21626	14897	12181	16500
Cook Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Costa Rica	11140	13006	10142	422965	10142	14724	7088	3959	3959	5211	5211	2637	14724	10142	3078	11234
Cote d'Ivoire	30185	14005	12125	505639	12125	17602	8473	11605	11605	14105	14105	7146	17602	12125	9042	13430
Croatia	10524	12740	10100	421218	10100	14663	7059	3432	3432	4923	4923	2492	14663	10100	2667	11187
Cuba	14130	13364	11574	482655	11574	16802	8088	5443	5443	6607	6607	3345	16802	11574	4236	12819
Cyprus	15107	13797	11660	486246	11660	16927	8148	6059	6059	7063	7063	3577	16927	11660	4716	12915
Czech Republic	8177	12349	9332	389178	9332	13548	6522	2213	2213	3826	3826	1936	13548	9332	1716	10336
Denmark	6999	11396	7380	307763	7380	10714	5157	1122	1122	3276	3276	1657	10714	7380	865	8174
Djibouti	7039	13531	11826	493190	11826	17169	8265	10225	10225	3295	3295	1667	17169	11826	7966	13099
Dominica	21620	14291	12081	503794	12081	17538	8442	7214	7214	10105	10105	5118	17538	12081	5617	13381
Dominican Republic	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Ecuador	25326	14873	13911	580134	13911	20195	9722	9284	9284	11836	11836	5996	20195	13911	7232	15408
Egypt	14642	19539	14842	618964	14842	21547	10372	2920	2920	6846	6846	3466	21547	14842	2268	16439
El Salvador	15608	15663	11866	494826	11866	17226	8292	5507	5507	7297	7297	3695	17226	11866	4285	13142
EquatorialGuinea	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Eritrea	13311	14026	13435	560269	13435	19504	9389	14997	14997	6225	6225	3151	19504	13435	11688	14881
Estonia	14013	13650	11655	486040	11655	16920	8145	3913	3913	6552	6552	3317	16920	11655	3042	12909
Ethiopia	16453	14136	14023	584805	14023	20358	9800	13006	13006	7692	7692	3895	20358	14023	10135	15532
Faeroe Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Falkland Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Fiji	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Finland	13371	12736	9045	377202	9045	13131	6321	2552	2552	6252	6252	3165	13131	9045	1981	10018
France	6076	11387	7301	304470	7301	10599	5102	1031	1031	2845	2845	1438	10599	7301	795	8087
French Guiana	17703	14230	11412	475903	11412	16567	7975	10104	10104	8275	8275	4191	16567	11412	7871	12640

Product codes	050290	050300	050400	051110	160100	160210	160220	160231	160239	160241	160242	160249	160250	160290	160300	410110
French Polynesia	10517	13167	8852	369164	8852	12851	6186	1686	1686	4919	4919	2490	12851	8852	1305	9805
French Southern Ant. Teritory	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Gabon	11273	13472	10348	431520	10348	15022	7231	4375	4375	5272	5272	2669	15022	10348	3403	11461
Gambia	19202	13643	11912	496760	11912	17293	8325	9199	9199	8976	8976	4546	17293	11912	7165	13194
Georgia	9494	15333	13308	554982	13308	19320	9300	7034	7034	4442	4442	2248	19320	13308	5476	14740
Germany	6619	11346	7324	305418	7324	10632	5118	1138	1138	3099	3099	1567	10632	7324	877	8112
Ghana	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Gibraltar	228	9928	3358	140032	3358	16789	3491	3080	3080	114	114	17	16789	3358	2392	3719
Greece	15756	14953	12027	501567	12027	17460	8405	5033	5033	7366	7366	3730	17460	12027	3916	13321
Greenland	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Grenada	9947	13367	10089	420735	10089	14646	7051	2984	2984	4653	4653	2355	14646	10089	2317	11175
Guadeloupe	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Guatemala	22765	15730	14003	583971	14003	20329	9786	4394	4394	10640	10640	5389	20329	14003	3418	15510
Guinea	16495	13443	11566	482322	11566	16790	8083	6976	6976	7711	7711	3905	16790	11566	5432	12810
Guineabissau	16205	13633	11874	495175	11874	17238	8298	10040	10040	7576	7576	3836	17238	11874	7822	13152
Guyana	7039	13455	11704	488101	11704	16992	8179	9020	9020	3295	3295	1667	16992	11704	7026	12964
Haiti	14806	13772	12146	506529	12146	17633	8488	12292	12292	6922	6922	3505	17633	12146	9578	13453
Honduras	12827	13382	11812	492595	11812	17148	8255	9308	9308	5998	5998	3037	17148	11812	7250	13083
Hong Kong	10517	13167	8852	369164	8852	12851	6186	1686	1686	4919	4919	2490	12851	8852	1305	9805
Hungary	8698	12636	9707	404797	9707	14092	6783	2284	2284	4070	4070	2059	14092	9707	1771	10751
Iceland	10517	13167	8852	369164	8852	12851	6186	1686	1686	4919	4919	2490	12851	8852	1305	9805
India	23639	15155	13549	565025	13549	19669	9468	10909	10909	11048	11048	5596	19669	13549	8499	15007
Indonesia	14359	14474	12612	525942	12612	18309	8814	11136	11136	6714	6714	3399	18309	12612	8676	13969
Iran	28543	15324	14871	620170	14871	21589	10393	6684	6684	13338	13338	6757	21589	14871	5203	16472
Iraq	51878	15931	14864	619890	14864	21579	10388	14866	14866	24236	24236	12282	21579	14864	11585	16464
Ireland	6327	11326	7153	298304	7153	10384	4999	1177	1177	2963	2963	1498	10384	7153	908	7923
Israel	24176	15133	14605	609076	14605	21203	10207	6980	6980	11298	11298	5723	21203	14605	5434	16177
Italy	10850	13190	9044	377164	9044	13130	6320	2112	2112	5075	5075	2569	13130	9044	1637	10017
Jamaica	15199	14905	11614	484347	11614	16861	8117	7731	7731	7106	7106	3598	16861	11614	6020	12864
Japan	12775	13461	8987	374803	8987	13048	6281	2633	2633	5974	5974	3024	13048	8987	2044	9955
Jordan	27135	14173	13642	568909	13642	19805	9534	16521	16521	12681	12681	6424	19805	13642	12876	15110
Kazakstan	19704	23384	17862	744887	17862	25931	12483	8778	8778	9210	9210	4665	25931	17862	6837	19784
Kenya	16128	13681	12051	502580	12051	17496	8422	10426	10426	7540	7540	3818	17496	12051	8122	13348
Kiribati	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
North Korea	14544	14851	11200	467080	11200	16260	7827	3680	3680	6800	6800	3443	16260	11200	2860	12406
South Korea	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Kuwait	10517	13167	8852	369164	8852	12851	6186	1686	1686	4919	4919	2490	12851	8852	1305	9805
Kyrgyzstan	48697	13956	12094	504358	12094	17558	8452	7784	7784	22750	22750	11529	17558	12094	6061	13396
Laos	8592	13437	11434	476844	11434	16600	7991	6273	6273	4021	4021	2034	16600	11434	4883	12665
Latvia	13321	13668	11065	461436	11065	16063	7733	3567	3567	6229	6229	3154	16063	11065	2773	12256
Lebanon	13917	14197	10467	436512	10467	15196	7315	5024	5024	6507	6507	3295	15196	10467	3908	11594
Liberia	450	10777	3166	132016	3166	15828	3291	5024	5024	218	218	34	15828	3166	3908	3506
Libya	19508	14262	14291	595985	14291	20747	9987	11039	11039	9119	9119	4618	20747	14291	8601	15829
Lithuania	8868	13324	11684	487259	11684	16962	8165	4178	4178	4150	4150	2100	16962	11684	3249	12941
Macau	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Macedonia	11331	13338	10332	430886	10332	15000	7221	2821	2821	5300	5300	2683	15000	10332	2190	11444
Madagascar	25751	14008	12241	510463	12241	17770	8554	12975	12975	12034	12034	6096	17770	12241	10110	13558
Malawi	15120	13546	11817	492795	11817	17155	8258	9994	9994	7069	7069	3580	17155	11817	7785	13088
Malaysia	18492	14266	12188	508283	12188	17694	8518	9587	9587	8644	8644	4378	17694	12188	7468	13500
Maldives	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Mali	18417	13566	11968	499096	11968	17374	8364	10381	10381	8609	8609	4360	17374	11968	8087	13256
Malta	8650	12629	9674	403437	9674	14044	6761	2383	2383	4047	4047	2048	14044	9674	1849	10715
Marshall Islands	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Martinique	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Mauritania	46879	16223	18110	755239	18110	26291	12656	35054	35054	21901	21901	11098	26291	18110	27332	20059
Mauritius	9091	13162	10028	418188	10028	14558	7008	2654	2654	4254	4254	2152	14558	10028	2060	11107
Mexico	12712	15455	11773	490965	11773	17091	8227	3611	3611	5945	5945	3009	17091	11773	2806	13040
Micronesia	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Moldova	9026	13502	11966	499033	11966	17372	8363	5839	5839	4223	4223	2137	17372	11966	4545	13254
Mongolia	7039	13235	12229	509994	12229	17754	8546	16581	16581	3295	3295	1667	17754	12229	12923	13545
Montserrat	7039	13400	11615	484392	11615	16862	8117	8142	8142	3295	3295	1667	16862	11615	6341	12865
Morocco	38831	16223	14959	623836	14959	21717	10454	18548	18548	18143	18143	9193	21717	14959	14457	16569
Mozambique	12736	13305	11558	481989	11558	16779	8077	7612	7612	5956	5956	3015	16779	11558	5928	12801
Myanmar	15291	13948	12986	541561	12986	18853	9075	10536	10536	7149	7149	3620	18853	12986	8208	14384
N.Caledonia	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
N.Mariana	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Nauru	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Nepal	11658	14117	13199	550433	13199	19161	9224	10810	10810	5452	5452	2760	19161	13199	8422	14619
Netherlands Antilles	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Netherlands	6538	11311	7238	301837	7238	10507	5058	1185	1185	3061	3061	1548	10507	7238	914	8017
New Zealand	11783	13210	9945	414721	9945	14437	6950	5370	5370	5511	5511	2790	14437	9945	4179	11015
Nicaragua	11718	14723	12717	530344	12717	18462	8887	9902	9902	5480	5480	2774	18462	12717	7713	14086
Niger	69795	15410	14693	612740	14693	21330	10268	16299	16299	32604	32604	16523	21330	14693	12703	16274
Nigeria	25789	14351	12433	518480	12433	18049	8688	16119	16119	12052	12052	6105	18049	12433	12563	13771

Product codes	050290	050300	050400	051110	160100	160210	160220	160231	160239	160241	160242	160249	160250	160290	160300	410110
Niue	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Norfolk Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Norway	10588	13184	8897	371039	8897	12916	6218	1364	1364	4953	4953	2507	12916	8897	1054	9855
Oman	28843	18807	16749	698460	16749	24315	11705	6970	6970	13478	13478	6828	24315	16749	5427	18551
Pakistan	33181	14411	13767	574125	13767	19986	9621	10081	10081	15504	15504	7855	19986	13767	7853	15249
Palau	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Panama	18055	14346	11247	469019	11247	16327	7860	8814	8814	8440	8440	4274	16327	11247	6865	12457
Papua New Guinea	6748	13108	11153	465112	11153	16191	7794	3597	3597	3159	3159	1597	16191	11153	2796	12353
Paraguay	20785	15161	12535	522733	12535	18197	8760	5709	5709	9715	9715	4921	18197	12535	4443	13884
Peru	19702	15464	13360	557168	13360	19396	9337	6775	6775	9209	9209	4664	19396	13360	5275	14798
Philippines	12889	13427	11501	479606	11501	16696	8037	6793	6793	6027	6027	3051	16696	11501	5288	12738
Pitcairn	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Poland	8024	12646	9580	399501	9580	13907	6695	2580	2580	3755	3755	1900	13907	9580	2003	10611
Portugal	16512	17732	14300	596367	14300	20761	9994	5178	5178	7720	7720	3909	20761	14300	4029	15839
Qatar	9696	13213	10267	428154	10267	14905	7175	2797	2797	4536	4536	2295	14905	10267	2172	11372
Reunion	10548	13309	10349	431578	10349	15024	7232	3173	3173	4934	4934	2497	15024	10349	2465	11463
Romania	11522	13586	10553	440104	10553	15321	7375	3253	3253	5389	5389	2728	15321	10553	2527	11689
Russia	18793	15045	12335	514390	12335	17907	8620	6041	6041	8784	8784	4449	17907	12335	4702	13662
Rwanda	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
South Africa	27502	17562	15165	632403	15165	22015	10598	6468	6468	12852	12852	6511	22015	15165	5035	16796
St.Vincent-Grenadine	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Samoa	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Sao Tome Prncipe	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Saudi Arabia	15596	13700	10705	446440	10705	15541	7481	5328	5328	7291	7291	3692	15541	10705	4146	11857
Senegal	16791	13586	11812	492609	11812	17149	8255	9029	9029	7849	7849	3975	17149	11812	7033	13084
Seychelles	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Sierra Leone	14884	13450	11597	483637	11597	16836	8105	7403	7403	6959	6959	3524	16836	11597	5764	12845
Singapore	19270	14259	10613	442601	10613	15408	7417	3996	3996	9007	9007	4562	15408	10613	3107	11755
Slovakia	10731	12940	9909	413224	9909	14385	6925	2992	2992	5019	5019	2540	14385	9909	2323	10975
Slovenia	9005	13151	10014	417614	10014	14538	6998	2580	2580	4214	4214	2132	14538	10014	2002	11092
Solomon Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Somalia	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Spain	9576	14826	11274	470175	11274	16368	7879	2464	2464	4480	4480	2267	16368	11274	1912	12488
Spec Cats	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Sri Lanka	22768	13844	12002	500505	12002	17423	8387	9518	9518	10641	10641	5390	17423	12002	7414	13293
St. Helena	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
St. Kitts Nev	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
St. Lucia	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
St. Pier. Miqu	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Sudan	20473	14028	12500	521281	12500	18147	8735	16772	16772	9569	9569	4847	18147	12500	13072	13845
Suriname	17679	14558	11161	465426	11161	16202	7799	8755	8755	8264	8264	4185	16202	11161	6819	12362
Sweden	8288	11862	7862	327872	7862	11414	5494	1204	1204	3879	3879	1962	11414	7862	929	8708
Switzerland-Liechnstine	7471	12832	8275	345089	8275	12013	5783	1113	1113	3497	3497	1769	12013	8275	858	9165
Syria	38111	16453	19776	824720	19776	28710	13820	12602	12602	17806	17806	9022	28710	19776	9820	21904
Taiwan	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
Tajikistan	25014	13684	12378	516190	12378	17969	8650	9724	9724	11690	11690	5922	17969	12378	7575	13710
Tanzania	20784	14425	12495	521095	12495	18140	8732	14507	14507	9715	9715	4920	18140	12495	11305	13840
Thailand	20173	15768	13821	576382	13821	20065	9659	7402	7402	9429	9429	4776	20065	13821	5763	15309
Togo	18846	13505	12067	503217	12067	17518	8433	10251	10251	8809	8809	4462	17518	12067	7986	13365
Tokelau	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Tonga	8693	13123	9978	416090	9978	14485	6973	2383	2383	4068	4068	2058	14485	9978	1849	11051
Trinidad Tobago	12417	13718	10445	435587	10445	15163	7299	4869	4869	5807	5807	2940	15163	10445	3788	11569
Tunisia	41256	54901	37769	1575091	37769	54832	26395	4417	4417	19275	19275	9767	54832	37769	3435	41834
Turkey	10153	14119	10433	435094	10433	15146	7291	2962	2962	4750	4750	2404	15146	10433	2301	11556
Turkmenistan	17029	15609	18563	774115	18563	26948	12972	8310	8310	7961	7961	4031	26948	18563	6471	20560
Turks Caicos Island	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Tuvalu	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Uganda	11541	13645	11916	496927	11916	17299	8327	10523	10523	5398	5398	2732	17299	11916	8198	13198
Ukraine	14649	13945	12316	513618	12316	17880	8607	7911	7911	6849	6849	3468	17880	12316	6160	13642
United Arab Emirates	26480	14046	11757	490293	11757	17068	8216	11585	11585	12375	12375	6269	17068	11757	9026	13022
United Kingdom	6605	11315	7315	305076	7315	10620	5112	1018	1018	3093	3093	1564	10620	7315	784	8103
Uruguay	13385	17020	12895	537755	12895	18720	9011	3621	3621	6259	6259	3169	18720	12895	2814	14283
US Msc.Pacific	8778	13123	9978	416090	9978	14485	6973	2383	2383	4107	4107	2078	14485	9978	1849	11051
USA	10564	14247	9485	395563	9485	13770	6629	1684	1684	4942	4942	2501	13770	9485	1304	10506
Uzbekistan	12549	13864	12694	529365	12694	18428	8871	6232	6232	5869	5869	2971	18428	12694	4851	14060
Vanuatu	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Venezuela	20685	15731	13772	574322	13772	19993	9624	11643	11643	9668	9668	4897	19993	13772	9072	15254
Viet Nam	10101	13895	13143	548102	13143	19080	9185	6356	6356	4725	4725	2391	19080	13143	4947	14557
Wallis Futuna Islands	7039	13079	11103	463016	11103	16118	7759	3080	3080	3295	3295	1667	16118	11103	2392	12298
Yemen	12955	13878	13073	545181	13073	18979	9136	10826	10826	6058	6058	3067	18979	13073	8435	14480
Yugoslavia	11527	13628	10784	449735	10784	15656	7536	3879	3879	5391	5391	2729	15656	10784	3016	11945
Zambia	19089	14279	13914	580243	13914	20199	9724	8142	8142	8923	8923	4519	20199	13914	6340	15411
Zimbabe	17930	13757	12363	515572	12363	17948	8640	6345	6345	8381	8381	4245	17948	12363	4939	13693
Global average	**6872**	**13664**	**9368**	**386389**	**8847**	**14352**	**5470**	**1768**	**2682**	**3682**	**3344**	**1834**	**15206**	**9712**	**2350**	**10243**

Product codes	410121	410122	410129	410130	410140	410210	410221	410229	410310	410390	410410	410421	410422	410429	410431	410439
Afghanistan	17867	17867	17867	14283	14283	9519	10025	10020	12849	14283	35783	35773	35773	35773	35773	35783
Albania	17530	17530	17530	14014	14014	9430	9931	9926	12667	14014	35109	35099	35099	35099	35099	35109
Algeria	19766	19766	19766	15802	15802	10810	11384	11379	11776	15802	39581	39571	39571	39571	39571	39581
Andorra	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Angola	16831	16831	16831	13455	13455	8886	9358	9353	12494	13455	33712	33702	33702	33702	33702	33712
Anguilla	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Antigua Barbuda	14819	14819	14819	11846	11846	8567	9023	9018	9801	11846	29689	29679	29679	29679	29679	29689
Argentina	15082	15082	15082	12055	12055	8684	9147	9141	9442	12055	30214	30204	30204	30204	30204	30214
Armenia	16952	16952	16952	13552	13552	9099	9583	9578	12228	13552	33954	33944	33944	33944	33944	33954
Aruba	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Australia	15318	15318	15318	12244	12244	9283	9777	9771	7813	12244	30686	30676	30676	30676	30676	30686
Austria	10487	10487	10487	8380	8380	7848	8266	8261	5821	8380	21024	21014	21014	21014	21014	21024
Azerbaijan	18036	18036	18036	14418	14418	9799	10320	10315	13415	14418	36121	36111	36111	36111	36111	36121
Bahamas	18101	18101	18101	14471	14471	10270	10816	10810	11611	14471	36252	36242	36242	36242	36242	36252
Bahrain	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Bangladesh	20293	20293	20293	16225	16225	10978	11561	11555	14871	16225	40637	40627	40627	40627	40627	40637
Barbados	14375	14375	14375	11490	11490	8428	8877	8872	9347	11490	28800	28790	28790	28790	28790	28800
Belarus	15437	15437	15437	12339	12339	9134	9620	9615	9880	12339	30924	30914	30914	30914	30914	30924
Belgium-Luxembourg	10025	10025	10025	8010	8010	7606	8011	8006	5674	8010	20099	20089	20089	20089	20089	20099
Belize	14698	14698	14698	11748	11748	8625	9084	9079	9816	11748	29446	29436	29436	29436	29436	29446
Benin	16620	16620	16620	13286	13286	8946	9422	9417	12759	13286	33290	33280	33280	33280	33280	33290
Bermuda	17688	17688	17688	14141	14141	9550	10057	10052	12856	14141	35427	35417	35417	35417	35417	35427
Bhutan	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Bolivia	19376	19376	19376	15491	15491	10438	10993	10987	13959	15491	38802	38792	38792	38792	38792	38802
Bosnia Herzegovina	15147	15147	15147	12108	12108	8211	8648	8643	11134	12108	30344	30334	30334	30334	30334	30344
British indian ocean territory	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
British virgin islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Brazil	17148	17148	17148	13708	13708	9178	9666	9661	10252	13708	34345	34335	34335	34335	34335	34345
Brunei	12269	12269	12269	9805	9805	8265	8705	8700	6446	9805	24587	24577	24577	24577	24577	24587
Bulgaria	14468	14468	14468	11565	11565	8651	9111	9106	9519	11565	28987	28977	28977	28977	28977	28987
Burkina Faso	16842	16842	16842	13463	13463	9032	9513	9507	13091	13463	33733	33723	33723	33723	33723	33733
Burundi	17174	17174	17174	13729	13729	9034	9515	9509	12729	13729	34397	34387	34387	34387	34387	34397
Cambodia	16072	16072	16072	12848	12848	8602	9060	9054	11805	12848	32195	32185	32185	32185	32185	32195
Cameroon	16247	16247	16247	12987	12987	8694	9157	9151	12057	12987	32543	32533	32533	32533	32533	32543
Canada	12588	12588	12588	10061	10061	8292	8733	8728	6473	10061	25227	25217	25217	25217	25217	25227
Cape Verde	19520	19520	19520	15606	15606	10033	10566	10561	14608	15606	39090	39080	39080	39080	39080	39090
Cayman Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Centtral African Republic	16060	16060	16060	12838	12838	8573	9029	9024	11970	12838	32170	32160	32160	32160	32160	32170
Chad	18243	18243	18243	14584	14584	9589	10099	10094	14049	14584	36535	36525	36525	36525	36525	36535
Chile	13167	13167	13167	10523	10523	8031	8459	8454	8592	10523	26383	26373	26373	26373	26373	26383
China	16447	16447	16447	13147	13147	8692	9155	9149	11823	13147	32943	32933	32933	32933	32933	32943
Christmas Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Cocos Islnds	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Colombia	15385	15385	15385	12298	12298	8727	9191	9186	9754	12298	30821	30811	30811	30811	30811	30821
Comoros	15716	15716	15716	12563	12563	8400	8847	8842	11526	12563	31482	31472	31472	31472	31472	31482
Congo	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Congo, D.R.	20637	20637	20637	16500	16500	11184	11778	11772	15596	16500	41324	41314	41314	41314	41314	41324
Cook Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Costa Rica	14055	14055	14055	11234	11234	8446	8896	8890	9114	11234	28160	28150	28150	28150	28150	28160
Cote d'Ivoire	16799	16799	16799	13430	13430	9004	9483	9478	13026	13430	33649	33639	33639	33639	33639	33649
Croatia	13997	13997	13997	11187	11187	8486	8938	8933	9018	11187	28044	28034	28034	28034	28034	28044
Cuba	16036	16036	16036	12819	12819	8634	9094	9089	11651	12819	32123	32113	32113	32113	32113	32123
Cyprus	16156	16156	16156	12915	12915	9261	9754	9749	10059	12915	32361	32351	32351	32351	32351	32361
Czech Republic	12933	12933	12933	10336	10336	8059	8489	8484	8550	10336	25916	25906	25906	25906	25906	25916
Denmark	10230	10230	10230	8174	8174	7796	8211	8206	5797	8174	20510	20500	20500	20500	20500	20510
Djibouti	16386	16386	16386	13099	13099	8705	9168	9163	12336	13099	32822	32812	32812	32812	32812	32822
Dominica	16738	16738	16738	13381	13381	9486	9991	9985	11033	13381	33526	33516	33516	33516	33516	33526
Dominican Republic	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Ecuador	19273	19273	19273	15408	15408	10696	11265	11259	11994	15408	38595	38585	38585	38585	38585	38595
Egypt	20562	20562	20562	16439	16439	9853	10376	10371	11394	16439	41174	41164	41164	41164	41164	41174
El Salvador	16441	16441	16441	13142	13142	8817	9286	9281	9978	13142	32931	32921	32921	32921	32921	32931
EquatorialGuinea	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Eritrea	18613	18613	18613	14881	14881	9850	10374	10368	13632	14881	37276	37266	37266	37266	37266	37276
Estonia	16149	16149	16149	12909	12909	9349	9846	9841	9949	12909	32348	32338	32338	32338	32338	32348
Ethiopia	19428	19428	19428	15532	15532	10357	10907	10902	13939	15532	38906	38896	38896	38896	38896	38906
Faeroe Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Falkland Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Fiji	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Finland	12535	12535	12535	10018	10018	8503	8955	8950	6680	10018	25121	25111	25111	25111	25111	25121
France	10121	10121	10121	8087	8087	7684	8094	8089	5657	8087	20292	20282	20282	20282	20282	20292
French Guiana	15812	15812	15812	12640	12640	8876	9349	9344	10817	12640	31675	31665	31665	31665	31665	31675

Product codes	410121	410122	410129	410130	410140	410210	410221	410229	410310	410390	410410	410421	410422	410429	410431	410439
French Polynesia	12269	12269	12269	9805	9805	8265	8705	8700	6446	9805	24587	24577	24577	24577	24577	24587
French Southern Ant. Teritory	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Gabon	14339	14339	14339	11461	11461	8432	8881	8876	9336	11461	28728	28718	28718	28718	28718	28728
Gambia	16505	16505	16505	13194	13194	8835	9305	9300	12377	13194	33059	33049	33049	33049	33049	33059
Georgia	18438	18438	18438	14740	14740	9288	9783	9777	12889	14740	36925	36915	36915	36915	36915	36925
Germany	10152	10152	10152	8112	8112	7710	8121	8116	5694	8112	20355	20345	20345	20345	20345	20355
Ghana	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Gibraltar	4661	4661	4661	3719	16152	2279	2405	2399	4053	3719	9373	9363	9363	9363	9363	40455
Greece	16664	16664	16664	13321	13321	9227	9718	9713	10032	13321	33379	33369	33369	33369	33369	33379
Greenland	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Grenada	13981	13981	13981	11175	11175	8344	8788	8783	9008	11175	28011	28001	28001	28001	28001	28011
Guadeloupe	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Guatemala	19400	19400	19400	15510	15510	10605	11168	11163	11941	15510	38850	38840	38840	38840	38840	38850
Guinea	16025	16025	16025	12810	12810	8571	9028	9023	11953	12810	32101	32091	32091	32091	32091	32101
Guineabissau	16452	16452	16452	13152	13152	8765	9231	9226	12467	13152	32954	32944	32944	32944	32944	32954
Guyana	16217	16217	16217	12964	12964	8628	9088	9082	12131	12964	32484	32474	32474	32474	32474	32484
Haiti	16829	16829	16829	13453	13453	8951	9428	9422	12823	13453	33708	33698	33698	33698	33698	33708
Honduras	16366	16366	16366	13083	13083	8675	9137	9132	11767	13083	32783	32773	32773	32773	32773	32783
Hong Kong	12269	12269	12269	9805	9805	8265	8705	8700	6446	9805	24587	24577	24577	24577	24577	24587
Hungary	13452	13452	13452	10751	10751	8218	8656	8651	8716	10751	26953	26943	26943	26943	26943	26953
Iceland	12269	12269	12269	9805	9805	8265	8705	8700	6446	9805	24587	24577	24577	24577	24577	24587
India	18771	18771	18771	15007	15007	9686	10201	10196	13350	15007	37592	37582	37582	37582	37582	37592
Indonesia	17474	17474	17474	13969	13969	8846	9317	9311	12167	13969	34997	34987	34987	34987	34987	34997
Iran	20602	20602	20602	16472	16472	11511	12123	12117	12848	16472	41254	41244	41244	41244	41244	41254
Iraq	20593	20593	20593	16464	16464	11180	11773	11768	12780	16464	41235	41225	41225	41225	41225	41235
Ireland	9916	9916	9916	7923	7923	7675	8085	8079	5730	7923	19882	19872	19872	19872	19872	19882
Israel	20234	20234	20234	16177	16177	11328	11930	11925	12442	16177	40517	40507	40507	40507	40507	40517
Italy	12534	12534	12534	10017	10017	8353	8798	8793	6429	10017	25118	25108	25108	25108	25108	25118
Jamaica	16093	16093	16093	12864	12864	8822	9292	9287	10435	12864	32235	32225	32225	32225	32225	32235
Japan	12456	12456	12456	9955	9955	8269	8710	8704	6793	9955	24962	24952	24952	24952	24952	24962
Jordan	18900	18900	18900	15110	15110	10205	10747	10742	10250	15110	37850	37840	37840	37840	37840	37850
Kazakstan	24742	24742	24742	19784	19784	10566	11128	11122	12611	19784	49535	49525	49525	49525	49525	49535
Kenya	16698	16698	16698	13348	13348	8893	9366	9361	12322	13348	33446	33436	33436	33436	33436	33446
Kiribati	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
North Korea	15519	15519	15519	12406	12406	8711	9174	9169	9677	12406	31089	31079	31079	31079	31079	31089
South Korea	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Kuwait	12269	12269	12269	9805	9805	8265	8705	8700	6446	9805	24587	24577	24577	24577	24577	24587
Kyrgyzstan	16757	16757	16757	13396	13396	9044	9526	9520	12617	13396	33564	33554	33554	33554	33554	33564
Laos	15844	15844	15844	12665	12665	8515	8968	8963	11756	12665	31737	31727	31727	31727	31727	31737
Latvia	15332	15332	15332	12256	12256	9021	9501	9496	9805	12256	30714	30704	30704	30704	30704	30714
Lebanon	14505	14505	14505	11594	11594	8638	9097	9092	9761	11594	29059	29049	29049	29049	29049	29059
Liberia	4395	4395	4395	3506	15227	2387	2518	2512	3556	3506	8841	8831	8831	8831	8831	38144
Libya	19799	19799	19799	15829	15829	10629	11193	11188	14360	15829	39648	39638	39638	39638	39638	39648
Lithuania	16189	16189	16189	12941	12941	8760	9226	9221	11806	12941	32429	32419	32419	32419	32419	32429
Macau	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Macedonia	14318	14318	14318	11444	11444	8483	8935	8930	9195	11444	28685	28675	28675	28675	28675	28685
Madagascar	16960	16960	16960	13558	13558	9058	9540	9535	13037	13558	33969	33959	33959	33959	33959	33969
Malawi	16373	16373	16373	13088	13088	8702	9165	9160	11926	13088	32796	32786	32786	32786	32786	32796
Malaysia	16887	16887	16887	13500	13500	9528	10034	10029	10479	13500	33825	33815	33815	33815	33815	33825
Maldives	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Mali	16582	16582	16582	13256	13256	8809	9278	9272	12153	13256	33215	33205	33205	33205	33205	33215
Malta	13406	13406	13406	10715	10715	8199	8636	8631	8667	10715	26863	26853	26853	26853	26853	26863
Marshall Islands	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Martinique	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Mauritania	25086	25086	25086	20059	20059	13237	13933	13933	19256	20059	50222	50212	50212	50212	50212	50222
Mauritius	13896	13896	13896	11107	11107	8279	8720	8715	8857	11107	27842	27832	27832	27832	27832	27842
Mexico	16312	16312	16312	13040	13040	8885	9358	9352	9937	13040	32675	32665	32665	32665	32665	32675
Micronesia	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Moldova	16580	16580	16580	13254	13254	8918	9392	9387	12113	13254	33210	33200	33200	33200	33200	33210
Mongolia	16944	16944	16944	13545	13545	8682	9144	9139	11361	13545	33938	33928	33928	33928	33928	33938
Montserrat	16094	16094	16094	12865	12865	8572	9029	9023	11983	12865	32238	32228	32228	32228	32228	32238
Morocco	20724	20724	20724	16569	16569	11001	11586	11580	14089	16569	41497	41487	41487	41487	41487	41497
Mozambique	16014	16014	16014	12801	12801	8502	8955	8950	11609	12801	32079	32069	32069	32069	32069	32079
Myanmar	17992	17992	17992	14384	14384	9645	10158	10152	13173	14384	36034	36024	36024	36024	36024	36034
N.Caledonia	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
N.Mariana	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Nauru	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Nepal	18287	18287	18287	14619	14619	9858	10382	10377	13381	14619	36623	36613	36613	36613	36613	36623
Netherlands Antilles	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Netherlands	10033	10033	10033	8017	8017	7687	8097	8091	5719	8017	20117	20107	20107	20107	20107	20117
New Zealand	13781	13781	13781	11015	11015	8255	8695	8690	9425	11015	27612	27602	27602	27602	27602	27612
Nicaragua	17620	17620	17620	14086	14086	9011	9491	9485	12768	14086	35289	35279	35279	35279	35279	35289
Niger	20355	20355	20355	16274	16274	11103	11693	11687	15819	16274	40760	40750	40750	40750	40750	40760
Nigeria	17226	17226	17226	13771	13771	9225	9716	9710	13296	13771	34502	34492	34492	34492	34492	34502

Product codes	410121	410122	410129	410130	410140	410210	410221	410229	410310	410390	410410	410421	410422	410429	410431	410439
Niue	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Norfolk Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Norway	12331	12331	12331	9855	9855	8316	8759	8753	6448	9855	24712	24702	24702	24702	24702	24712
Oman	23201	23201	23201	18551	18551	11782	12407	12402	13593	18551	46452	46442	46442	46442	46442	46452
Pakistan	19073	19073	19073	15249	15249	10373	10924	10919	13918	15249	38196	38186	38186	38186	38186	38196
Palau	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Panama	15584	15584	15584	12457	12457	8944	9420	9414	10280	12457	31218	31208	31208	31208	31208	31218
Papua New Guinea	15454	15454	15454	12353	12353	8280	8721	8716	11208	12353	30958	30948	30948	30948	30948	30958
Paraguay	17367	17367	17367	13884	13884	9599	10110	10104	10807	13884	34784	34774	34774	34774	34774	34784
Peru	18510	18510	18510	14798	14798	10112	10650	10644	11389	14798	37070	37060	37060	37060	37060	37070
Philippines	15935	15935	15935	12738	12738	8545	9000	8995	11817	12738	31920	31910	31910	31910	31910	31920
Pitcairn	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Poland	13276	13276	13276	10611	10611	8134	8567	8562	8681	10611	26602	26592	26592	26592	26592	26602
Portugal	19812	19812	19812	15839	15839	9935	10463	10458	11039	15839	39673	39663	39663	39663	39663	39673
Qatar	14227	14227	14227	11372	11372	8441	8890	8885	8961	11372	28504	28494	28494	28494	28494	28504
Reunion	14341	14341	14341	11463	11463	8488	8940	8935	8994	11463	28731	28721	28721	28721	28721	28731
Romania	14624	14624	14624	11689	11689	8555	9010	9005	9303	11689	29298	29288	29288	29288	29288	29298
Russia	17090	17090	17090	13662	13662	9511	10017	10012	10715	13662	34230	34220	34220	34220	34220	34230
Rwanda	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
South Africa	21008	21008	21008	16796	16796	10921	11501	11496	12669	16796	42066	42056	42056	42056	42056	42066
St.Vincent-Grenadine	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Samoa	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Sao Tome Prncipe	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Saudi Arabia	14834	14834	14834	11857	11857	8628	9087	9082	9736	11857	29718	29708	29708	29708	29708	29718
Senegal	16367	16367	16367	13084	13084	8741	9206	9201	12306	13084	32784	32774	32774	32774	32774	32784
Seychelles	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Sierra Leone	16069	16069	16069	12845	12845	8586	9043	9038	11997	12845	32188	32178	32178	32178	32178	32188
Singapore	14707	14707	14707	11755	11755	9279	9773	9768	7733	11755	29463	29453	29453	29453	29453	29463
Slovakia	13731	13731	13731	10975	10975	8352	8797	8792	9037	10975	27513	27503	27503	27503	27503	27513
Slovenia	13877	13877	13877	11092	11092	8273	8714	8708	8838	11092	27804	27794	27794	27794	27794	27804
Solomon Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Somalia	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Spain	15622	15622	15622	12488	12488	8674	9136	9130	9417	12488	31294	31284	31284	31284	31284	31294
Spec Cats	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Sri Lanka	16629	16629	16629	13293	13293	8964	9441	9436	12553	13293	33308	33298	33298	33298	33298	33308
St. Helena	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
St. Kitts Nev	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
St. Lucia	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
St. Pier. Miqu	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Sudan	17319	17319	17319	13845	13845	9130	9616	9611	13246	13845	34688	34678	34678	34678	34678	34688
Suriname	15464	15464	15464	12362	12362	8895	9368	9363	10672	12362	30979	30969	30969	30969	30969	30979
Sweden	10898	10898	10898	8708	8708	7984	8410	8404	6060	8708	21845	21835	21835	21835	21835	21845
Switzerland-Liechnstine	11469	11469	11469	9165	9165	7929	8352	8346	6007	9165	22989	22979	22979	22979	22979	22989
Syria	27393	27393	27393	21904	21904	15156	15959	15953	20041	21904	54836	54826	54826	54826	54826	54836
Taiwan	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Tajikistan	17150	17150	17150	13710	13710	9124	9610	9605	12410	13710	34350	34340	34340	34340	34340	34350
Tanzania	17313	17313	17313	13840	13840	9348	9845	9840	13339	13840	34675	34665	34665	34665	34665	34675
Thailand	19148	19148	19148	15309	15309	10284	10831	10825	11264	15309	38346	38336	38336	38336	38336	38346
Togo	16719	16719	16719	13365	13365	8886	9359	9354	11859	13365	33488	33478	33478	33478	33478	33488
Tokelau	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Tonga	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
Trinidad Tobago	14474	14474	14474	11569	11569	8513	8966	8961	9570	11569	28998	28988	28988	28988	28988	28998
Tunisia	52305	52305	52305	41834	41834	15087	15886	15881	21068	41834	104660	104650	104650	104650	104650	104660
Turkey	14457	14457	14457	11556	11556	8219	8657	8651	8920	11556	28965	28955	28955	28955	28955	28965
Turkmenistan	25713	25713	25713	20560	20560	14173	14924	14918	18596	20560	51476	51466	51466	51466	51466	51476
Turks Caicos Island	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Tuvalu	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Uganda	16510	16510	16510	13198	13198	8805	9274	9269	12248	13198	33071	33061	33061	33061	33061	33071
Ukraine	17064	17064	17064	13642	13642	9073	9556	9550	12529	13642	34179	34169	34169	34169	34169	34179
United Arab Emirates	16290	16290	16290	13022	13022	9557	10066	10060	7013	13022	32630	32620	32620	32620	32620	32630
United Kingdom	10141	10141	10141	8103	8103	7759	8173	8168	5778	8103	20332	20322	20322	20322	20322	20332
Uruguay	17866	17866	17866	14283	14283	9196	9686	9680	10273	14283	35781	35771	35771	35771	35771	35781
US Msc.Pacific	13827	13827	13827	11051	11051	8257	8697	8692	8786	11051	27703	27693	27693	27693	27693	27703
USA	13145	13145	13145	10506	10506	8357	8802	8797	6632	10506	26340	26330	26330	26330	26330	26340
Uzbekistan	17587	17587	17587	14060	14060	9536	10044	10038	12969	14060	35224	35214	35214	35214	35214	35224
Vanuatu	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Venezuela	19080	19080	19080	15254	15254	10099	10636	10631	10945	15254	38210	38200	38200	38200	38200	38210
Viet Nam	18209	18209	18209	14557	14557	9868	10393	10388	13314	14557	36469	36459	36459	36459	36459	36469
Wallis Futuna Islands	15384	15384	15384	12298	12298	8249	8689	8683	11126	12298	30819	30809	30809	30809	30809	30819
Yemen	18112	18112	18112	14480	14480	9666	10181	10175	13289	14480	36275	36265	36265	36265	36265	36275
Yugoslavia	14944	14944	14944	11945	11945	8694	9157	9152	9417	11945	29937	29927	29927	29927	29927	29937
Zambia	19276	19276	19276	15411	15411	10466	11022	11017	14407	15411	38603	38593	38593	38593	38593	38603
Zimbabe	17129	17129	17129	13693	13693	9257	9750	9744	12774	13693	34309	34299	34299	34299	34299	34309
Global average	**12840**	**11399**	**13243**	**10446**	**10199**	**8756**	**8651**	**8998**	**9422**	**10467**	**29227**	**29720**	**28287**	**27319**	**27381**	**27832**

Product codes	410511	410512	410519	410520	410611	410612	410619	410620	410710	410790	410800	410900	411000	411100	420400	420500
Afghanistan	11161	11161	11161	11161	14299	14299	14299	14299	17836	35783	35773	35773	35773	35773	35773	35773
Albania	11057	11057	11057	11057	14097	14097	14097	14097	41957	35109	35099	35099	35099	35099	35099	35099
Algeria	12671	12671	12671	12671	13106	13106	13106	13106	55223	39581	39571	39571	39571	39571	39571	39571
Andorra	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Angola	10421	10421	10421	10421	13904	13904	13904	13904	14344	33712	33702	33702	33702	33702	33702	33702
Anguilla	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Antigua Barbuda	10048	10048	10048	10048	10913	10913	10913	10913	26980	29689	29679	29679	29679	29679	29679	29679
Argentina	10185	10185	10185	10185	10513	10513	10513	10513	22145	30214	30204	30204	30204	30204	30204	30204
Armenia	10670	10670	10670	10670	13609	13609	13609	13609	17231	33954	33944	33944	33944	33944	33944	33944
Aruba	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Australia	10885	10885	10885	10885	8703	8703	8703	8703	39035	30686	30676	30676	30676	30676	30676	30676
Austria	9207	9207	9207	9207	6490	6490	6490	6490	14739	21024	21014	21014	21014	21014	21014	21014
Azerbaijan	11489	11489	11489	11489	14928	14928	14928	14928	87671	36121	36111	36111	36111	36111	36111	36111
Bahamas	12040	12040	12040	12040	12923	12923	12923	12923	41753	36252	36242	36242	36242	36242	36242	36242
Bahrain	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Bangladesh	12867	12867	12867	12867	16546	16546	16546	16546	27792	40637	40627	40627	40627	40627	40627	40627
Barbados	9886	9886	9886	9886	10408	10408	10408	10408	23849	28800	28790	28790	28790	28790	28790	28790
Belarus	10711	10711	10711	10711	11000	11000	11000	11000	28920	30924	30914	30914	30914	30914	30914	30914
Belgium-Luxembourg	8924	8924	8924	8924	6326	6326	6326	6326	11723	20099	20089	20089	20089	20089	20089	20089
Belize	10116	10116	10116	10116	10929	10929	10929	10929	28148	29446	29436	29436	29436	29436	29436	29436
Benin	10492	10492	10492	10492	14199	14199	14199	14199	37839	33290	33280	33280	33280	33280	33280	33280
Bermuda	11197	11197	11197	11197	14307	14307	14307	14307	19673	35427	35417	35417	35417	35417	35417	35417
Bhutan	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Bolivia	12236	12236	12236	12236	15533	15533	15533	15533	25345	38802	38792	38792	38792	38792	38792	38792
Bosnia Herzegovina	9631	9631	9631	9631	12393	12393	12393	12393	14300	30344	30334	30334	30334	30334	30334	30334
British indian ocean territory	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
British virgin islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Brazil	10763	10763	10763	10763	11413	11413	11413	11413	31903	34345	34335	34335	34335	34335	34335	34335
Brunei	9695	9695	9695	9695	7185	7185	7185	7185	21429	24587	24577	24577	24577	24577	24577	24577
Bulgaria	10146	10146	10146	10146	10599	10599	10599	10599	25884	28987	28977	28977	28977	28977	28977	28977
Burkina Faso	10592	10592	10592	10592	14568	14568	14568	14568	59002	33733	33723	33723	33723	33723	33723	33723
Burundi	10594	10594	10594	10594	14166	14166	14166	14166	28508	34397	34387	34387	34387	34387	34387	34387
Cambodia	10088	10088	10088	10088	13139	13139	13139	13139	14622	32195	32185	32185	32185	32185	32185	32185
Cameroon	10196	10196	10196	10196	13419	13419	13419	13419	25681	32543	32533	32533	32533	32533	32533	32533
Canada	9726	9726	9726	9726	7214	7214	7214	7214	20901	25227	25217	25217	25217	25217	25217	25217
Cape Verde	11762	11762	11762	11762	16253	16253	16253	16253	70025	39090	39080	39080	39080	39080	39080	39080
Cayman Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Centtral African Republic	10055	10055	10055	10055	13322	13322	13322	13322	24713	32170	32160	32160	32160	32160	32160	32160
Chad	11243	11243	11243	11243	15632	15632	15632	15632	57666	36535	36525	36525	36525	36525	36525	36525
Chile	9421	9421	9421	9421	9569	9569	9569	9569	17028	26383	26373	26373	26373	26373	26373	26373
China	10194	10194	10194	10194	13159	13159	13159	13159	16108	32943	32933	32933	32933	32933	32933	32933
Christmas Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Cocos Islnds	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Colombia	10235	10235	10235	10235	10860	10860	10860	10860	25730	30821	30811	30811	30811	30811	30811	30811
Comoros	9853	9853	9853	9853	12829	12829	12829	12829	14344	31482	31472	31472	31472	31472	31472	31472
Congo	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Congo, D.R.	13108	13108	13108	13108	17351	17351	17351	17351	46206	41324	41314	41314	41314	41314	41314	41314
Cook Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Costa Rica	9906	9906	9906	9906	10149	10149	10149	10149	22700	28160	28150	28150	28150	28150	28150	28150
Cote d'Ivoire	10559	10559	10559	10559	14496	14496	14496	14496	61507	33649	33639	33639	33639	33639	33639	33639
Croatia	9954	9954	9954	9954	10042	10042	10042	10042	21445	28044	28034	28034	28034	28034	28034	28034
Cuba	10127	10127	10127	10127	12968	12968	12968	12968	28792	32123	32113	32113	32113	32113	32113	32113
Cyprus	10860	10860	10860	10860	11198	11198	11198	11198	30783	32361	32351	32351	32351	32351	32351	32351
Czech Republic	9454	9454	9454	9454	9522	9522	9522	9522	16661	25916	25906	25906	25906	25906	25906	25906
Denmark	9146	9146	9146	9146	6463	6463	6463	6463	14261	20510	20500	20500	20500	20500	20500	20500
Djibouti	10209	10209	10209	10209	13728	13728	13728	13728	14344	32822	32812	32812	32812	32812	32812	32812
Dominica	11123	11123	11123	11123	12281	12281	12281	12281	44053	33526	33516	33516	33516	33516	33516	33516
Dominican Republic	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Ecuador	12538	12538	12538	12538	13349	13349	13349	13349	51605	38595	38585	38585	38585	38585	38585	38585
Egypt	11552	11552	11552	11552	12682	12682	12682	12682	29834	41174	41164	41164	41164	41164	41164	41164
El Salvador	10340	10340	10340	10340	11109	11109	11109	11109	31803	32931	32921	32921	32921	32921	32921	32921
EquatorialGuinea	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Eritrea	11548	11548	11548	11548	15169	15169	15169	15169	27124	37276	37266	37266	37266	37266	37266	37266
Estonia	10963	10963	10963	10963	11077	11077	11077	11077	28553	32348	32338	32338	32338	32338	32338	32338
Ethiopia	12141	12141	12141	12141	15510	15510	15510	15510	33525	38906	38896	38896	38896	38896	38896	38896
Faeroe Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Falkland Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Fiji	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Finland	9973	9973	9973	9973	7444	7444	7444	7444	27245	25121	25111	25111	25111	25111	25111	25111
France	9016	9016	9016	9016	6308	6308	6308	6308	12380	20292	20282	20282	20282	20282	20282	20282
French Guiana	10410	10410	10410	10410	12041	12041	12041	12041	36071	31675	31665	31665	31665	31665	31665	31665

Product codes	410511	410512	410519	410520	410611	410612	410619	410620	410710	410790	410800	410900	411000	411100	420400	420500
French Polynesia	9695	9695	9695	9695	7185	7185	7185	7185	21429	24587	24577	24577	24577	24577	24577	24577
French Southern Ant. Teritory	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Gabon	9891	9891	9891	9891	10395	10395	10395	10395	22969	28728	28718	28718	28718	28718	28718	28718
Gambia	10361	10361	10361	10361	13775	13775	13775	13775	39127	33059	33049	33049	33049	33049	33049	33049
Georgia	10892	10892	10892	10892	14344	14344	14344	14344	19345	36925	36915	36915	36915	36915	36915	36915
Germany	9046	9046	9046	9046	6349	6349	6349	6349	13487	20355	20345	20345	20345	20345	20345	20345
Ghana	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Gibraltar	2694	2694	2694	2694	4525	4525	4525	4525	464	40455	9363	9363	9363	9363	9363	9363
Greece	10820	10820	10820	10820	11168	11168	11168	11168	32106	33379	33369	33369	33369	33369	33369	33369
Greenland	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Grenada	9787	9787	9787	9787	10031	10031	10031	10031	20268	28011	28001	28001	28001	28001	28001	28001
Guadeloupe	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Guatemala	12431	12431	12431	12431	13290	13290	13290	13290	46387	38850	38840	38840	38840	38840	38840	38840
Guinea	10053	10053	10053	10053	13303	13303	13303	13303	33611	32101	32091	32091	32091	32091	32091	32091
Guineabissau	10279	10279	10279	10279	13874	13874	13874	13874	33019	32954	32944	32944	32944	32944	32944	32944
Guyana	10119	10119	10119	10119	13502	13502	13502	13502	14344	32484	32474	32474	32474	32474	32474	32474
Haiti	10497	10497	10497	10497	14270	14270	14270	14270	30168	33708	33698	33698	33698	33698	33698	33698
Honduras	10175	10175	10175	10175	13096	13096	13096	13096	26136	32783	32773	32773	32773	32773	32773	32773
Hong Kong	9695	9695	9695	9695	7185	7185	7185	7185	21429	24587	24577	24577	24577	24577	24577	24577
Hungary	9640	9640	9640	9640	9706	9706	9706	9706	17723	26953	26943	26943	26943	26943	26943	26943
Iceland	9695	9695	9695	9695	7185	7185	7185	7185	21429	24587	24577	24577	24577	24577	24577	24577
India	11357	11357	11357	11357	14856	14856	14856	14856	48168	37592	37582	37582	37582	37582	37582	37582
Indonesia	10374	10374	10374	10374	13542	13542	13542	13542	29259	34997	34987	34987	34987	34987	34987	34987
Iran	13492	13492	13492	13492	14298	14298	14298	14298	58161	41254	41244	41244	41244	41244	41244	41244
Iraq	13104	13104	13104	13104	14222	14222	14222	14222	105708	41235	41225	41225	41225	41225	41225	41225
Ireland	9005	9005	9005	9005	6389	6389	6389	6389	12893	19882	19872	19872	19872	19872	19872	19872
Israel	13278	13278	13278	13278	13846	13846	13846	13846	49261	40517	40507	40507	40507	40507	40507	40507
Italy	9798	9798	9798	9798	7165	7165	7165	7165	22108	25118	25108	25108	25108	25108	25108	25108
Jamaica	10347	10347	10347	10347	11617	11617	11617	11617	30971	32235	32225	32225	32225	32225	32225	32225
Japan	9700	9700	9700	9700	7570	7570	7570	7570	26032	24962	24952	24952	24952	24952	24952	24952
Jordan	11964	11964	11964	11964	11411	11411	11411	11411	55292	37850	37840	37840	37840	37840	37840	37840
Kazakstan	12386	12386	12386	12386	14034	14034	14034	14034	40150	49535	49525	49525	49525	49525	49525	49525
Kenya	10429	10429	10429	10429	13713	13713	13713	13713	32863	33446	33436	33436	33436	33436	33436	33436
Kiribati	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
North Korea	10216	10216	10216	10216	10774	10774	10774	10774	29634	31089	31079	31079	31079	31079	31079	31079
South Korea	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Kuwait	9695	9695	9695	9695	7185	7185	7185	7185	21429	24587	24577	24577	24577	24577	24577	24577
Kyrgyzstan	10606	10606	10606	10606	14041	14041	14041	14041	99226	33564	33554	33554	33554	33554	33554	33554
Laos	9987	9987	9987	9987	13085	13085	13085	13085	17508	31737	31727	31727	31727	31727	31727	31727
Latvia	10579	10579	10579	10579	10917	10917	10917	10917	27144	30714	30704	30704	30704	30704	30704	30704
Lebanon	10130	10130	10130	10130	10867	10867	10867	10867	28358	29059	29049	29049	29049	29049	29049	29049
Liberia	2819	2819	2819	2819	3973	3973	3973	3973	918	38144	8831	8831	8831	8831	8831	8831
Libya	12459	12459	12459	12459	15978	15978	15978	15978	39750	39648	39638	39638	39638	39638	39638	39638
Lithuania	10274	10274	10274	10274	13140	13140	13140	13140	18071	32429	32419	32419	32419	32419	32419	32419
Macau	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Macedonia	9950	9950	9950	9950	10239	10239	10239	10239	23089	28685	28675	28675	28675	28675	28675	28675
Madagascar	10622	10622	10622	10622	14508	14508	14508	14508	52471	33969	33959	33959	33959	33959	33959	33959
Malawi	10205	10205	10205	10205	13274	13274	13274	13274	30809	32796	32786	32786	32786	32786	32786	32786
Malaysia	11171	11171	11171	11171	11665	11665	11665	11665	37679	33825	33815	33815	33815	33815	33815	33815
Maldives	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Mali	10331	10331	10331	10331	13525	13525	13525	13525	37526	33215	33205	33205	33205	33205	33205	33205
Malta	9618	9618	9618	9618	9652	9652	9652	9652	17625	26863	26853	26853	26853	26853	26853	26853
Marshall Islands	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Martinique	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Mauritania	15510	15510	15510	15510	21418	21418	21418	21418	95521	50222	50212	50212	50212	50212	50212	50212
Mauritius	9711	9711	9711	9711	9864	9864	9864	9864	18524	27842	27832	27832	27832	27832	27832	27832
Mexico	10420	10420	10420	10420	11063	11063	11063	11063	25902	32675	32665	32665	32665	32665	32665	32665
Micronesia	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Moldova	10458	10458	10458	10458	13481	13481	13481	13481	18392	33210	33200	33200	33200	33200	33200	33200
Mongolia	10182	10182	10182	10182	12645	12645	12645	12645	14344	33938	33928	33928	33928	33928	33928	33928
Montserrat	10054	10054	10054	10054	13336	13336	13336	13336	14344	32238	32228	32228	32228	32228	32228	32228
Morocco	12895	12895	12895	12895	15677	15677	15677	15677	79122	41497	41487	41487	41487	41487	41487	41487
Mozambique	9972	9972	9972	9972	12921	12921	12921	12921	25951	32079	32069	32069	32069	32069	32069	32069
Myanmar	11308	11308	11308	11308	14659	14659	14659	14659	31157	36034	36024	36024	36024	36024	36024	36024
N.Caledonia	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
N.Mariana	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Nauru	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Nepal	11558	11558	11558	11558	14890	14890	14890	14890	23754	36623	36613	36613	36613	36613	36613	36613
Netherlands Antilles	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Netherlands	9019	9019	9019	9019	6377	6377	6377	6377	13322	20117	20107	20107	20107	20107	20107	20107
New Zealand	9683	9683	9683	9683	10495	10495	10495	10495	24010	27612	27602	27602	27602	27602	27602	27602
Nicaragua	10567	10567	10567	10567	14209	14209	14209	14209	23877	35289	35279	35279	35279	35279	35279	35279
Niger	13014	13014	13014	13014	17599	17599	17599	17599	142216	40760	40750	40750	40750	40750	40750	40750
Nigeria	10818	10818	10818	10818	14795	14795	14795	14795	52548	34502	34492	34492	34492	34492	34492	34492

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Norfolk Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Norway	9754	9754	9754	9754	7186	7186	7186	7186	21575	24712	24702	24702	24702	24702	24702	24702
Oman	13808	13808	13808	13808	15126	15126	15126	15126	58772	46452	46442	46442	46442	46442	46442	46442
Pakistan	12160	12160	12160	12160	15487	15487	15487	15487	67611	38196	38186	38186	38186	38186	38186	38186
Palau	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Panama	10489	10489	10489	10489	11445	11445	11445	11445	36790	31218	31208	31208	31208	31208	31208	31208
Papua New Guinea	9712	9712	9712	9712	12475	12475	12475	12475	13749	30958	30948	30948	30948	30948	30948	30948
Paraguay	11255	11255	11255	11255	12030	12030	12030	12030	42352	34784	34774	34774	34774	34774	34774	34774
Peru	11855	11855	11855	11855	12677	12677	12677	12677	40146	37070	37060	37060	37060	37060	37060	37060
Philippines	10023	10023	10023	10023	13152	13152	13152	13152	26264	31920	31910	31910	31910	31910	31910	31910
Pitcairn	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Poland	9542	9542	9542	9542	9668	9668	9668	9668	16351	26602	26592	26592	26592	26592	26592	26592
Portugal	11648	11648	11648	11648	12288	12288	12288	12288	33646	39673	39663	39663	39663	39663	39663	39663
Qatar	9901	9901	9901	9901	9979	9979	9979	9979	19756	28504	28494	28494	28494	28494	28494	28494
Reunion	9956	9956	9956	9956	10015	10015	10015	10015	21492	28731	28721	28721	28721	28721	28721	28721
Romania	10034	10034	10034	10034	10359	10359	10359	10359	23478	29298	29288	29288	29288	29288	29288	29288
Russia	11153	11153	11153	11153	11928	11928	11928	11928	38292	34230	34220	34220	34220	34220	34220	34220
Rwanda	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
South Africa	12801	12801	12801	12801	14098	14098	14098	14098	56038	42066	42056	42056	42056	42056	42056	42056
St.Vincent-Grenadine	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Samoa	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Sao Tome Prncipe	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Saudi Arabia	10119	10119	10119	10119	10840	10840	10840	10840	31778	29718	29708	29708	29708	29708	29708	29708
Senegal	10251	10251	10251	10251	13695	13695	13695	13695	34213	32784	32774	32774	32774	32774	32774	32774
Seychelles	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Sierra Leone	10070	10070	10070	10070	13352	13352	13352	13352	30327	32188	32178	32178	32178	32178	32178	32178
Singapore	10881	10881	10881	10881	8614	8614	8614	8614	39264	29463	29453	29453	29453	29453	29453	29453
Slovakia	9797	9797	9797	9797	10063	10063	10063	10063	21865	27513	27503	27503	27503	27503	27503	27503
Slovenia	9704	9704	9704	9704	9842	9842	9842	9842	18350	27804	27794	27794	27794	27794	27794	27794
Solomon Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Somalia	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Spain	10173	10173	10173	10173	10486	10486	10486	10486	19513	31294	31284	31284	31284	31284	31284	31284
Spec Cats	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Sri Lanka	10512	10512	10512	10512	13969	13969	13969	13969	46393	33308	33298	33298	33298	33298	33298	33298
St. Helena	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
St. Kitts Nev	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
St. Lucia	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
St. Pier. Miqu	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Sudan	10707	10707	10707	10707	14740	14740	14740	14740	41716	34688	34678	34678	34678	34678	34678	34678
Suriname	10431	10431	10431	10431	11880	11880	11880	11880	36023	30979	30969	30969	30969	30969	30969	30969
Sweden	9366	9366	9366	9366	6755	6755	6755	6755	16888	21845	21835	21835	21835	21835	21835	21835
Switzerland-Liechnstine	9302	9302	9302	9302	6696	6696	6696	6696	15223	22989	22979	22979	22979	22979	22979	22979
Syria	17754	17754	17754	17754	22290	22290	22290	22290	77655	54836	54826	54826	54826	54826	54826	54826
Taiwan	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
Tajikistan	10700	10700	10700	10700	13811	13811	13811	13811	50970	34350	34340	34340	34340	34340	34340	34340
Tanzania	10961	10961	10961	10961	14843	14843	14843	14843	42350	34675	34665	34665	34665	34665	34665	34665
Thailand	12056	12056	12056	12056	12538	12538	12538	12538	41105	38346	38336	38336	38336	38336	38336	38336
Togo	10421	10421	10421	10421	13198	13198	13198	13198	38401	33488	33478	33478	33478	33478	33478	33478
Tokelau	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Tonga	9686	9686	9686	9686	9784	9784	9784	9784	17713	27703	27693	27693	27693	27693	27693	27693
Trinidad Tobago	9984	9984	9984	9984	10656	10656	10656	10656	25300	28998	28988	28988	28988	28988	28988	28988
Tunisia	17673	17673	17673	17673	23431	23431	23431	23431	84063	104660	104650	104650	104650	104650	104650	104650
Turkey	9641	9641	9641	9641	9933	9933	9933	9933	20689	28965	28955	28955	28955	28955	28955	28955
Turkmenistan	16604	16604	16604	16604	20684	20684	20684	20684	34699	51476	51466	51466	51466	51466	51466	51466
Turks Caicos Island	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Tuvalu	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Uganda	10327	10327	10327	10327	13631	13631	13631	13631	23516	33071	33061	33061	33061	33061	33061	33061
Ukraine	10640	10640	10640	10640	13943	13943	13943	13943	29850	34179	34169	34169	34169	34169	34169	34169
United Arab Emirates	11206	11206	11206	11206	7814	7814	7814	7814	53956	32630	32620	32620	32620	32620	32620	32620
United Kingdom	9103	9103	9103	9103	6442	6442	6442	6442	13459	20332	20322	20322	20322	20322	20322	20322
Uruguay	10784	10784	10784	10784	11437	11437	11437	11437	27274	35781	35771	35771	35771	35771	35771	35771
US Msc.Pacific	9686	9686	9686	9686	9784	9784	9784	9784	17886	27703	27693	27693	27693	27693	27693	27693
USA	9803	9803	9803	9803	7391	7391	7391	7391	21526	26340	26330	26330	26330	26330	26330	26330
Uzbekistan	11182	11182	11182	11182	14432	14432	14432	14432	25571	35224	35214	35214	35214	35214	35214	35214
Vanuatu	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Venezuela	11840	11840	11840	11840	12183	12183	12183	12183	42148	38210	38200	38200	38200	38200	38200	38200
Viet Nam	11570	11570	11570	11570	14815	14815	14815	14815	20583	36469	36459	36459	36459	36459	36459	36459
Wallis Futuna Islands	9676	9676	9676	9676	12384	12384	12384	12384	14344	30819	30809	30809	30809	30809	30809	30809
Yemen	11334	11334	11334	11334	14788	14788	14788	14788	26397	36275	36265	36265	36265	36265	36265	36265
Yugoslavia	10197	10197	10197	10197	10486	10486	10486	10486	23489	29937	29927	29927	29927	29927	29927	29927
Zambia	12269	12269	12269	12269	16030	16030	16030	16030	38895	38603	38593	38593	38593	38593	38593	38593
Zimbabe	10855	10855	10855	10855	14216	14216	14216	14216	36534	34309	34299	34299	34299	34299	34299	34299
Global average	**10018**	**10476**	**10571**	**9927**	**11678**	**13394**	**12879**	**10919**	**19172**	**32969**	**25998**	**27834**	**26930**	**24385**	**34215**	**33522**

Appendix XII. International virtual flows by livestock product (1995-99)

Product code	Product	Virtual water flow	
		Volume (Gm^3/yr)	Contribution to global volume (%)
020230	Bovine cuts boneless, frozen	53.98	16.09
410429	Bovine and equine leather, tanned or retanned, not else specified	41.26	12.30
020130	Bovine cuts boneless, fresh or chilled	26.06	7.77
010290	Bovine, live except pure-bred breeding	20.48	6.10
410121	Bovine hides, whole, fresh or wet-salted	20.08	5.98
410422	Bovine leather, otherwise pre-tanned, not else specified	14.13	4.21
020120	Bovine cuts bone in, fresh or chilled	13.13	3.91
040690	Cheese not else specified	9.64	2.87
040210	Milk powder not exceeding 1.5% fat	7.53	2.24
040221	Milk and cream powder unsweetened exceeding 1.5% fat	7.35	2.19
410431	Bovine and equine leather, full/split grains, not else specified	6.56	1.95
160250	Bovine meat and meat offal not else specified, excluding livers, prepared or preserved	6.36	1.89
020329	Swine cuts, frozen not else specified	5.55	1.65
160100	Sausage & similar products of meat, meat offal / blood & food prepared based on these products	5.25	1.56
020110	Bovine carcasses and half carcasses, fresh or chilled	4.81	1.43
020220	Bovine cuts bone in, frozen	4.02	1.20
020629	Bovine edible offal, frozen, not else specified	3.82	1.14
410439	Bovine and equine leather, not else specified	3.77	1.12
040120	Milk not concentrated & unsweetened exceeding 1% not exceeding 6% fat	3.61	1.08
050400	Guts, bladders and stomachs of animals except fish whole or in pieces	3.52	1.05
010410	Sheep, live	3.28	0.98
020319	Swine cuts, fresh or chilled, not else specified	3.27	0.97
411000	Parings and other waste of leather; leather dust, powder and flour	3.04	0.90
020312	Hams, shoulders and cuts thereof, of swine bone in, fresh or chilled	2.98	0.89
420500	Articles of leather or of composition leather, not else specified	2.93	0.87
020442	Sheep cuts, bone in, frozen	2.73	0.81
410410	Bovine skin leather, whole	2.66	0.79
010392	Swine, live except pure-bred breeding weighing 50 kg or more	2.56	0.76
040700	Eggs, bird, in shell, fresh, preserved or cooked	1.84	0.55
410110	Bovine skins, whole, raw	1.77	0.53
410210	Sheep or lamb skins, raw, with wool on, not else specified	1.76	0.52
040630	Cheese processed, not grated or powdered	1.70	0.51
020311	Swine carcasses and half carcasses, fresh or chilled	1.67	0.50
020621	Bovine tongues, edible offal, frozen	1.63	0.49

Product code	Product	Virtual water flow	
		Volume (Gm^3/yr)	Contribution to global volume (%)
020443	Sheep cuts, boneless, frozen	1.57	0.47
410390	Raw hides and skins of animals, not else specified s	1.48	0.44
010210	Bovine, live pure-bred breeding	1.42	0.42
410130	Bovine hides, raw, not else specified	1.30	0.39
050100	Hair, human, unworked washed or scoured or not and waste	1.29	0.39
040610	Cheese, fresh (including whey cheese) unfermented, and curd	1.18	0.35
021019	Swine meat & meat offal not else specified /excluding livers / including mixtures, prepared or preserved	1.18	0.35
411100	Composition leather, in slabs, sheets or strip	1.08	0.32
020500	Horse, ass, mule or hinny meat, fresh, chilled or frozen	1.08	0.32
410129	Hide sections, bovine, not else specified, fresh or wet-salted	1.05	0.31
020210	Bovine carcasses and half carcasses, frozen	1.03	0.31
020622	Bovine livers, edible offal, frozen	0.98	0.29
160239	Dom fowl, duck, goose & guinea fowl meat & meat offal prepared / preserved excluding livers	0.92	0.28
020610	Bovine edible offal, fresh or chilled	0.92	0.27
010119	Horses, live except pure-bred breeding	0.90	0.27
020410	Lamb carcasses and half carcasses, fresh or chilled	0.89	0.27
040130	Milk and cream not concentrated and unsweetened exceeding 6% fat	0.87	0.26
410900	Patent leather and patent laminated leather; metallised leather	0.83	0.25
040291	Milk and cream unsweetened, not else specified	0.82	0.24
040390	Buttermilk, curdled milk & cream, kephir & ferm or acid milk & cream not else specified	0.76	0.23
010600	Animals, live, not else specified	0.75	0.22
040110	Milk not concentrated and unsweetened not exceeding 1% fat	0.72	0.21
020322	Hams, shoulders and cuts thereof, of swine, bone in, frozen	0.70	0.21
051110	Semen bovine	0.70	0.21
040229	Milk and cream powder sweetened exceeding 1.5% fat	0.67	0.20
020890	Meat and edible meat offal, not else specified, fresh, chilled or frozen	0.66	0.20
040410	Whey whether or not concentrated or sweetened	0.64	0.19
040299	Milk and cream not else specified sweetened	0.61	0.18
410710	Swine leather, not else specified	0.56	0.17
020422	Sheep cuts, bone in, fresh or chilled	0.52	0.15
021090	Meat & edible meat offal cured not else specified & edible meat or offal, flours & meals	0.52	0.15
040310	Yoghurt concentrated or not, sweetened or not, flavoured or containing, fruit or cocoa	0.49	0.15
020430	Lamb carcasses and half carcasses, frozen	0.49	0.15
420400	Articles of leather or of composition leather, for technical uses	0.49	0.15

Product code	Product	Virtual water flow	
		Volume (Gm³/yr)	Contribution to global volume (%)
160249	Swine meat cured, not else specified	0.49	0.15
020321	Swine carcasses and half carcasses, frozen	0.46	0.14
160241	Hams and cuts thereof of swine prepared or preserved	0.46	0.14
020441	Sheep carcasses and half carcasses, frozen	0.44	0.13
020900	Pig fat lean meat free & poultry fat unrendered, fresh, chilled, frozen or curd	0.44	0.13
040620	Cheese, grated or powdered, of all kinds	0.41	0.12
410421	Bovine leather, vegetable pre-tanned, not else specified	0.38	0.11
020649	Swine edible offal, frozen, not else specified	0.37	0.11
410122	Butts and bends, bovine, fresh or wet-salted	0.36	0.11
410221	Sheep or lamb skins, pickled, without wool on	0.36	0.11
020820	Frog legs, fresh, chilled or frozen	0.35	0.11
050210	Bristles, hair and waste of pigs, hogs or boars	0.32	0.10
010391	Swine, live except pure-bred breeding weighing less than 50 kg	0.31	0.09
160210	Homogenized preparations of meat and meat offal	0.27	0.08
020690	Sheep, goats, asses, mules or hinnies edible offal, frozen	0.26	0.08
020421	Sheep carcasses and half carcasses, fresh or chilled	0.26	0.08
020423	Sheep cuts, boneless, fresh or chilled	0.26	0.08
160290	Meat, meat offal or blood, prepared or preserved, not else specified	0.26	0.08
160242	Shoulders and cut thereof of swine prepared or preserved	0.25	0.07
021012	Bellies, streaky and cuts thereof, swine cured	0.24	0.07
160220	Livers of any animal prepared or preserved	0.24	0.07
410790	Leather, not else specified	0.23	0.07
040640	Cheese, blue-veined	0.22	0.07
010599	Poultry, live except domestic fowls, weighing more than 185 g	0.18	0.05
410800	Chamois (including combination chamois) leather	0.18	0.05
410229	Sheep or lamb skins, raw, o/t pickled, without wool on	0.18	0.05
410520	Sheep or lamb skin leather, not else specified	0.17	0.05
020810	Rabbit or hare meat and edible meat offal, fresh, chilled or frozen	0.15	0.04
040490	Products consisting of natural milk constituents sweetened or not, not else specified	0.15	0.04
410140	Equine hides and skins, raw	0.14	0.04
160231	Turkey meat and meat offal prepared or preserved, excluding livers	0.13	0.04
010420	Goats, live	0.12	0.04
410512	Sheep or lamb skin leather, otherwise pre-tanned	0.12	0.04
020630	Swine edible offal, fresh or chilled	0.11	0.03
021011	Hams, shoulders and cuts thereof, of swine bone in, cured	0.11	0.03
021020	Bovine meat cured	0.11	0.03

Product code	Product	Virtual water flow	
		Volume (Gm^3/yr)	Contribution to global volume (%)
040899	Eggs, bird, not in shell not else specified	0.11	0.03
410519	Sheep or lamb skin leather, tanned or retanned, not else specified	0.11	0.03
410619	Goat or kid skin leather, tanned or retanned, not else specified	0.094	0.028
020450	Goat meat, fresh, chilled or frozen	0.091	0.027
040819	Egg yolks not else specified	0.086	0.026
041000	Edible products of animal origin not else specified	0.083	0.025
410310	Goat or kid hides and skins, raw, not else specified	0.068	0.020
410620	Goat or kid skin leather, not else specified	0.061	0.018
050300	Horsehair & waste put up or not as a layer with or without supg material	0.056	0.017
030510	Fish meal fit for human consumption	0.046	0.014
040811	Egg yolks dried	0.044	0.013
010120	Asses, mules and hinnies, live	0.042	0.013
020680	Sheep, goats, asses, mules or hinnies edible offal, fresh or chilled	0.040	0.012
010511	Fowls, live domestic weighing not more than 185 g	0.039	0.011
410511	Sheep or lamb skin leather, vegetable pre-tanned	0.038	0.011
160300	Extracts & juices of meat, fish, or crust, molluscs / other aquatic invertebrate	0.037	0.011
010111	Horses, live pure-bred breeding	0.035	0.010
410612	Goat or kid skin leather, otherwise pre-tanned	0.035	0.010
010310	Swine, live pure-bred breeding	0.035	0.010
040891	Eggs, bird, not in shell, dried	0.032	0.010
020641	Swine livers, edible offal, frozen	0.032	0.009
050290	Hair and waste of badger and of other brush making hair	0.020	0.006
410611	Goat or kid skin leather, vegetable pre-tanned	0.013	0.004
010519	Poultry, live except domestic fowls, weighing not more than 185 g	0.007	0.002
	Grand total	**336**	**100**

Appendix XIII. Gross virtual water export by country per year (1995-99)

Exporter	Gross virtual water export (Gm^3/yr)					
	1995	1996	1997	1998	1999	Average
Albania	0.00	0.05	0.05	0.06	0.00	0.03
Algeria	0.04	0.06	0.04	0.04	0.02	0.04
Argentina	14.03	12.84	12.29	8.91	10.85	11.79
Armenia	0.00	0.00	0.05	0.00	0.03	0.02
Australia	36.39	36.21	40.96	42.10	43.29	39.79
Austria	2.28	2.59	2.91	3.27	3.72	2.96
Azerbaijan	0.00	0.00	0.00	0.09	0.09	0.03
Bangladesh	0.74	0.59	0.52	0.46	0.00	0.46
Barbados	0.00	0.00	0.01	0.01	0.01	0.01
Belarus	0.00	0.00	0.00	1.10	0.96	0.41
Belgium-Luxembourg	8.50	8.53	8.46	8.02	7.40	8.18
Bolivia	0.12	0.11	0.17	0.16	0.22	0.15
Brazil	8.79	11.04	11.78	13.63	16.08	12.26
Brunei	0.0000	0.0000	0.0011	0.0005	0.0000	0.0003
Canada	12.40	19.15	21.69	20.70	17.43	18.28
Chile	0.19	0.19	0.37	0.35	0.49	0.32
China	7.40	6.73	7.15	7.01	6.62	6.98
Colombia	0.61	0.40	0.45	1.03	0.63	0.62
Costa Rica	0.68	1.83	0.54	0.48	0.56	0.82
Croatia	0.28	0.32	0.35	0.33	0.32	0.32
Cyprus	0.06	0.08	0.12	0.09	0.08	0.08
Czech Republic	1.58	1.25	1.37	1.33	1.20	1.35
Denmark	7.39	7.11	8.09	7.70	7.83	7.62
Ecuador	0.07	0.08	0.04	0.05	0.05	0.06
Egypt	0.13	0.11	0.15	0.26	0.09	0.15
El Salvador	0.05	0.09	0.11	0.03	0.08	0.07
Estonia	0.39	0.01	0.75	0.66	0.41	0.44
Finland	0.65	0.63	0.78	0.65	0.63	0.67
France	17.92	17.17	18.11	16.65	16.98	17.37
Gambia	0.0003	0.0008	0.0012	0.0006	0.0000	0.0006
Germany	16.67	16.93	17.73	17.81	17.75	17.38
Ghana	0.00	0.00	0.00	0.00	0.00	0.00
Greece	0.43	0.43	0.47	0.42	1.41	0.63
Guatemala	0.19	0.17	0.15	0.28	0.48	0.25
Honduras	0.18	0.19	0.09	0.07	0.05	0.12
Hong Kong	0.98	0.84	0.57	0.29	0.19	0.58
Hungary	1.55	2.02	2.28	1.81	1.62	1.86
Iceland	0.02	0.03	0.02	0.02	0.02	0.02

Exporter	Gross virtual water export (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
India	7.34	7.02	7.71	6.86	0.00	5.79
Indonesia	0.48	0.25	0.48	0.47	0.57	0.45
Ireland	11.44	9.31	8.71	9.12	6.17	8.95
Israel	0.23	0.42	0.24	0.10	0.10	0.22
Italy	8.44	9.75	10.61	10.32	11.18	10.06
Japan	1.31	1.34	1.24	1.09	0.97	1.19
Jordan	0.29	0.00	0.62	0.70	0.00	0.32
Kyrgyzstan	0.12	0.17	0.00	0.00	0.00	0.06
Latvia	0.16	0.19	0.24	0.22	0.16	0.20
Lithuania	1.43	1.25	1.57	1.17	1.24	1.33
Macau	0.01	0.01	0.01	0.00	0.00	0.01
Madagascar	0.15	0.08	0.05	0.03	0.04	0.07
Malaysia	1.29	1.46	1.28	1.16	1.25	1.29
Malta	0.00	0.00	0.00	0.00	0.01	0.00
Mauritius	0.09	0.07	0.07	0.06	0.03	0.06
Mexico	4.44	2.49	2.93	2.89	3.95	3.34
Moldova	0.91	0.00	0.00	0.00	0.45	0.27
Morocco	0.06	0.12	0.17	0.00	0.00	0.07
Nepal	0.0000	0.0000	0.0000	0.0140	0.0000	0.0028
Netherlands	15.89	15.61	14.60	13.62	15.05	14.95
New Zealand	19.37	20.62	21.47	21.67	20.52	20.73
Nicaragua	0.98	0.86	1.25	0.94	1.08	1.02
Niger	0.46	0.86	0.60	0.65	0.00	0.51
Nigeria	0.00	0.11	0.01	0.02	0.01	0.03
Norway	0.31	0.29	0.37	0.34	0.49	0.36
Oman	0.35	0.35	0.21	0.19	0.41	0.30
Panama	0.20	0.27	0.34	0.33	0.35	0.30
Paraguay	1.28	1.11	1.39	0.00	1.09	0.98
Peru	0.04	0.03	0.03	0.03	0.03	0.03
Philippines	0.00	0.01	0.02	0.02	0.00	0.01
Poland	2.83	3.22	4.49	5.34	3.68	3.91
Portugal	0.76	0.84	1.09	1.09	1.04	0.96
Romania	1.05	0.86	1.12	0.49	0.87	0.88
Russia	0.00	4.82	4.97	4.19	2.72	3.34
Saudi Arabia	0.45	0.47	0.00	0.59	0.00	0.30
Senegal	0.00	0.05	0.05	0.05	0.03	0.04
Singapore	0.39	0.40	0.38	0.31	0.37	0.37
Slovakia	0.57	0.58	0.65	0.67	0.65	0.62
Slovenia	0.51	0.47	0.53	0.61	0.64	0.55

Exporter	Gross virtual water export (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Spain	4.44	5.46	6.90	7.19	8.81	6.56
Sri Lanka	0.00	5.79	4.59	1.35	0.01	2.35
South Africa	0.26	0.29	0.38	0.19	2.23	0.67
South Korea	4.36	4.66	4.85	4.07	3.88	4.36
Sudan	0.56	0.31	0.62	0.74	0.00	0.45
Sweden	0.59	0.68	0.79	0.74	0.76	0.71
Switzerland Liechtenstein	0.59	0.60	0.54	0.47	0.57	0.55
Tanzania	0.00	0.00	0.12	0.11	0.11	0.07
Thailand	2.64	2.50	2.93	2.79	2.78	2.73
Togo	0.002	0.006	0.006	0.007	0.006	0.006
Trinidad Tobago	0.05	0.02	0.02	0.02	0.00	0.02
Tunisia	0.06	0.03	0.04	0.06	0.06	0.05
Turkey	0.45	0.41	0.58	0.67	0.43	0.51
Uganda	0.07	0.09	0.00	0.14	0.10	0.08
United Kingdom	8.66	5.73	4.52	4.65	4.43	5.60
Uruguay	5.33	6.13	7.45	7.56	6.83	6.66
USA	61.64	64.82	70.53	68.75	72.37	67.62
Venezuela	0.30	0.39	0.40	0.46	0.49	0.41
Yugoslavia	0.00	0.31	0.32	0.22	0.00	0.17
Total	**314**	**332**	**354**	**341**	**337**	**336**

Appendix XIV. Gross virtual water import by country per year (1995-99)

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Afghanistan	0.002	0.017	0.003	0.007	0.004	0.007
Albania	0.175	0.141	0.091	0.092	0.156	0.131
Algeria	1.121	1.062	0.950	1.411	1.199	1.149
Andorra	0.110	0.087	0.095	0.081	0.081	0.091
Angola	0.214	0.299	0.368	0.365	0.371	0.323
Anguilla	0.000	0.000			0.000	0.000
Antigua Barbados	0.011	0.011	0.022	0.015	0.010	0.014
Argentina	0.476	0.830	1.066	1.807	1.243	1.085
Armenia	0.014	0.016	0.017	0.021	0.023	0.018
Aruba	0.029	0.030	0.027	0.027	0.027	0.028
Australia	1.182	0.991	1.010	0.866	1.032	1.016
Austria	1.061	1.125	1.418	1.730	2.005	1.468
Azerbaijan	0.057	0.091	0.154	0.176	0.096	0.115
Bahamas	0.081	0.095	0.115	0.141	0.129	0.112
Bahrain	0.353	0.334	0.294	0.365	0.268	0.323
Bangladesh	0.132	0.140	0.189	0.201	0.203	0.173
Barbados	0.091	0.098	0.105	0.099	0.115	0.102
Belarus	0.090	0.097	0.204	0.199	0.074	0.133
Belgium-Luxembourg	4.369	4.593	4.334	4.595	4.548	4.488
Belize	0.017	0.016	0.018	0.019	0.018	0.018
Benin	0.056	0.037	0.045	0.052	0.034	0.045
Bermuda	0.044	0.037	0.052	0.040	0.045	0.043
Bhutan	0.0005		0.0003		0.0003	0.0002
Bolivia	0.316	0.261	0.251	0.170	0.177	0.235
Bosnia Herzegovina	0.320	0.663	0.740	0.865	0.799	0.677
Brazil	6.688	5.923	5.457	3.939	3.449	5.091
British Indian Ocean Territory					0.001	0.0001
British Virgin Islands	0.002	0.002	0.003	0.004	0.003	0.003
Brunei	0.153	0.191	0.170	0.125	0.127	0.153
Bulgaria	0.679	0.257	0.620	0.794	0.514	0.573
Burkina Faso	0.010	0.012	0.018	0.024	0.013	0.016
Burundi	0.005	0.000	0.003	0.001	0.001	0.002
Cambodia	0.031	0.029	0.110	0.038	0.044	0.050
Cameroon	0.012	0.020	0.025	0.022	0.029	0.021
Canada	6.792	6.929	6.965	6.861	7.579	7.025
Cape Verde	0.028	0.018	0.018	0.025	0.029	0.023
Cayman Islands	0.061	0.014	0.024	0.053	0.041	0.038
Central African Republic	0.002	0.001	0.001	0.001	0.004	0.002

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Chad	0.001	0.001	0.004	0.001	0.001	0.002
Chile	1.901	3.538	2.647	1.909	2.399	2.479
China	4.147	5.188	6.605	8.123	8.350	6.483
Christmas Islands	0.003	0.001	0.001	0.000	0.000	0.001
Cocos Islands	0.0000	0.0000			0.0001	0.00003
Colombia	0.603	0.638	0.498	0.453	0.339	0.506
Comoros	0.057	0.063	0.064	0.056	0.066	0.061
Congo	0.196	0.104	0.130	0.137	0.087	0.131
Congo, D.R.	0.177	0.195	0.141	0.072	0.052	0.127
Cook Islands	0.009	0.008	0.007	0.010	0.011	0.009
Costa Rica	0.251	0.194	0.573	0.259	0.252	0.306
Cote d'Ivoire	0.105	0.126	0.141	0.135	0.143	0.130
Croatia	0.756	1.756	1.012	0.739	0.579	0.968
Cuba	0.352	0.232	0.300	0.336	0.354	0.315
Cyprus	0.118	0.092	0.102	0.104	0.114	0.106
Czech Republic	0.666	0.726	0.527	0.704	0.661	0.657
Denmark	1.711	1.728	2.174	1.761	1.838	1.842
Djibouti	0.012	0.011	0.016	0.015	0.017	0.014
Dominica	0.006	0.006	0.008	0.009	0.005	0.007
Dominican Republic	0.946	1.022	1.367	1.361	1.288	1.197
Ecuador	0.097	0.127	0.132	0.133	0.044	0.107
Egypt	3.224	2.887	2.953	3.310	2.851	3.045
El Salvador	0.491	0.856	0.911	0.315	0.850	0.685
Equatorial Guinea	0.013	0.016	0.007	0.009	0.014	0.011
Eritrea	0.003	0.000	0.000	0.003	0.005	0.002
Estonia	0.131	0.301	0.281	0.259	0.179	0.230
Ethiopia	0.005	0.002	0.002	0.003	0.004	0.003
Faeroe Islands	0.018	0.019	0.024	0.024	0.027	0.022
Falkland Island	0.003	0.003	0.003	0.001	0.000	0.002
Fiji	0.159	0.148	0.168	0.173	0.212	0.172
Finland	0.408	0.384	0.447	0.470	0.471	0.436
France	14.258	12.885	11.500	11.771	11.908	12.464
French Guiana	0.051					0.010
French Polynesia	0.160	0.173	0.180	0.209	0.203	0.185
French Southern Ant. Territories	0.002	0.002				0.001
Gabon	0.177	0.161	0.231	0.186	0.150	0.181
Gambia	0.004	0.007	0.010	0.012	0.017	0.010
Georgia	0.041	0.060	0.086	0.070	0.052	0.062
Germany	17.469	17.056	15.725	16.093	15.820	16.433

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Ghana	0.178	0.114	0.121	0.126	0.156	0.139
Gibraltar	0.031	0.030	0.021	0.019	0.018	0.024
Greece	3.308	3.023	3.160	3.319	3.374	3.237
Greenland	0.014	0.018	0.037	0.034	0.033	0.027
Grenada	0.016	0.013	0.014	0.018	0.013	0.015
Guadeloupe	0.130					0.026
Guatemala	0.270	0.437	0.403	0.481	0.500	0.418
Guinea	0.041	0.027	0.030	0.013	0.019	0.026
Guinea Bissau	0.007	0.008	0.002	0.001	0.002	0.004
Guyana	0.037	0.029	0.033	0.042	0.024	0.033
Haiti	0.044	0.044	0.057	0.085	0.077	0.061
Honduras	0.105	0.211	0.183	0.165	0.240	0.181
Hong Kong	14.933	17.989	18.844	15.758	18.594	17.224
Hungary	0.790	0.842	1.067	0.953	0.602	0.851
Iceland	0.005	0.005	0.011	0.007	0.003	0.006
India	0.423	3.602	3.414	1.755	0.930	2.025
Indonesia	5.240	7.073	7.386	2.224	4.936	5.372
Iran	0.992	1.281	1.064	1.260	0.501	1.020
Iraq	0.095	0.004	0.448	0.581	0.358	0.297
Ireland	1.041	0.810	0.680	0.682	0.710	0.785
Israel	1.503	0.857	1.787	2.239	1.981	1.673
Italy	30.623	32.739	33.177	37.936	35.950	34.085
Jamaica	0.237	0.199	0.294	0.323	0.328	0.276
Japan	30.841	29.681	29.994	29.715	30.425	30.131
Jordan	1.035	0.826	0.814	0.914	0.827	0.883
Kazakhstan	0.033	0.164	0.185	0.247	0.164	0.159
Kenya	0.016	0.009	0.012	0.020	0.021	0.016
Kiribati	0.010	0.008	0.006	0.006	0.008	0.008
Kuwait	0.944	0.897	0.823	1.076	0.771	0.902
Kyrgyzstan	0.008	0.013	0.013	0.018	0.018	0.014
Laos	0.019	0.016	0.019	0.020	0.012	0.017
Latvia	0.096	0.244	0.320	0.348	0.270	0.255
Lebanon	1.179	1.160	1.584	1.400	1.069	1.279
Liberia	0.023	0.014	0.016	0.022	0.032	0.022
Libya	0.725	0.398	0.880	0.909	0.344	0.651
Lithuania	0.051	0.384	0.312	0.243	0.167	0.231
Macau	0.113	0.119	0.112	0.112	0.101	0.111
Macedonia	0.125	0.322	0.317	0.388	0.290	0.288
Madagascar	0.004	0.008	0.010	0.013	0.008	0.008

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Malawi	0.012	0.004	0.005	0.004	0.019	0.009
Malaysia	4.004	4.158	4.298	3.270	2.324	3.611
Maldives	0.016	0.023	0.023	0.022	0.022	0.021
Mali	0.018	0.034	0.036	0.041	0.038	0.034
Malta	0.207	0.220	0.208	0.217	0.197	0.210
Marshall Islands	0.008	0.006	0.006	0.007	0.009	0.007
Martinique	0.139					0.028
Mauritania	0.021	0.027	0.028	0.021	0.020	0.023
Mauritius	0.401	0.372	0.404	0.348	0.237	0.352
Mexico	3.661	5.702	8.876	9.714	10.452	7.681
Micronesia	0.011	0.012	0.012	0.014	0.015	0.013
Moldova	0.052	0.046	0.096	0.132	0.081	0.081
Mongolia	0.002	0.010	0.003	0.022	0.049	0.017
Montserrat	0.0001	0.0001	0.0001	0.0000	0.0010	0.0003
Morocco	0.345	0.394	0.306	0.372	0.334	0.350
Mozambique	0.038	0.012	0.016	0.016	0.193	0.055
Myanmar	0.109	0.132	0.137	0.122	0.126	0.125
N.Caledonia	0.043	0.043	0.048	0.043	0.048	0.045
N.Mariana	0.003	0.002	0.005	0.005	0.004	0.004
Nauru	0.008	0.010	0.009	0.005	0.007	0.008
Nepal	0.005	0.002	0.003	0.007	0.004	0.004
Netherlands Antilles	0.181	0.158	0.167	0.151	0.140	0.159
Netherlands	11.067	10.414	11.579	11.246	10.218	10.905
New Zealand	0.352	0.324	0.287	0.342	0.326	0.326
Nicaragua	0.032	0.117	0.050	0.078	0.108	0.077
Niger	0.014	0.012	0.019	0.019	0.015	0.016
Nigeria	0.504	0.898	0.630	0.704	0.146	0.576
Niue	0.001	0.001	0.000	0.001	0.001	0.001
Norfolk Island	0.001	0.001	0.001	0.002	0.002	0.001
North Korea	0.063	0.087	0.077	0.059	0.051	0.067
Norway	0.189	0.207	0.166	0.155	0.179	0.179
Oman	0.600	1.057	0.557	0.445	0.441	0.620
Pakistan	0.109	0.158	0.135	0.241	0.158	0.160
Palau	0.001	0.002	0.004	0.004	0.005	0.003
Panama	0.091	0.103	0.123	0.120	0.154	0.118
Papua New Guinea	0.744	0.749	0.675	0.583	0.539	0.658
Paraguay	1.366	0.687	0.451	0.197	0.167	0.574
Peru	0.654	0.737	0.688	0.629	0.634	0.668
Philippines	3.042	3.661	4.658	3.844	3.612	3.763

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Pitcairn					0.0004	0.0001
Poland	1.132	1.770	1.807	1.433	1.271	1.483
Portugal	4.704	4.143	4.081	4.511	4.695	4.427
Qatar	0.262	0.240	0.244	0.357	0.180	0.256
Reunion	0.123					0.025
Romania	0.887	0.474	0.491	1.025	0.751	0.726
Russia	9.228	11.716	15.974	13.200	11.172	12.258
Rwanda	0.007	0.005	0.013	0.009	0.006	0.008
S.Vincent-Grenadine	0.010	0.008	0.011	0.011	0.011	0.010
Samoa	0.050	0.055	0.049	0.057	0.050	0.052
Sao Tome Principe	0.002	0.004	0.001	0.003	0.005	0.003
Saudi Arabia	3.012	2.663	2.734	2.647	1.804	2.572
Senegal	0.064	0.050	0.053	0.065	0.065	0.060
Seychelles	0.014	0.016	0.017	0.019	0.021	0.017
Sierra Leone	0.008	0.010	0.003	0.004	0.006	0.006
Singapore	2.464	2.576	2.366	2.184	2.560	2.430
Slovakia	0.372	0.446	0.460	0.636	0.680	0.519
Slovenia	0.584	0.419	0.449	0.419	0.414	0.457
Solomon Islands	0.006	0.006	0.008	0.004	0.002	0.005
Somalia	0.005	0.000	0.001	0.001	0.002	0.002
South Africa	2.005	2.451	2.245	1.604	1.711	2.003
South Korea	18.191	16.319	21.121	13.525	19.777	17.787
Spain	6.815	7.597	8.046	8.276	7.413	7.629
Spec Cats	0.403	0.358	0.064	0.362	0.309	0.299
Sri Lanka	0.361	0.329	0.362	0.443	0.421	0.383
St.Helena	0.001	0.001	0.000	0.000	0.001	0.001
St.Kitts Nevis	0.006	0.007	0.004	0.005	0.005	0.005
St.Lucia	0.031	0.030	0.031	0.029	0.028	0.030
St.Piere. Miquelon	0.005	0.004	0.001	0.001	0.001	0.002
Sudan	0.015	0.011	0.020	0.018	0.027	0.018
Suriname	0.019	0.026	0.023	0.026	0.008	0.020
Sweden	1.069	1.536	1.306	1.504	1.702	1.424
Switzerland-Liechtenstein	0.909	0.800	0.807	0.838	0.870	0.845
Syria	0.337	0.300	0.248	0.141	0.225	0.250
Taiwan	9.021	9.588	10.537	12.457	11.728	10.666
Tajikistan	0.005	0.003	0.009	0.006	0.004	0.005
Tanzania	0.006	0.002	0.006	0.002	0.007	0.005
Thailand	3.334	3.239	3.797	2.861	2.685	3.183
Togo	0.010	0.009	0.011	0.010	0.008	0.009

Importer	Gross virtual water import (Gm³/yr)					
	1995	1996	1997	1998	1999	Average
Tokelau				0.008	0.001	0.002
Tonga	0.051	0.048	0.049	0.061	0.045	0.051
Trinidad Tobago	0.168	0.169	0.205	0.207	0.213	0.193
Tunisia	0.270	0.257	0.364	0.366	0.278	0.307
Turkey	2.858	2.753	2.200	1.618	0.842	2.054
Turkmenistan	0.115	0.257	0.070	0.040	0.048	0.106
Turks Caicos Islands	0.002	0.003	0.003	0.002	0.005	0.003
Tuvalu	0.0003	0.0006	0.0007	0.0004	0.0005	0.0005
Uganda	0.004	0.005	0.007	0.006	0.001	0.004
Ukraine	0.265	0.458	0.547	0.553	0.316	0.428
United Arab Emirates	2.914	2.609	2.827	2.865	1.214	2.486
United Kingdom	10.587	10.874	11.794	10.666	9.739	10.732
Uruguay	0.221	0.339	0.281	0.161	0.291	0.259
US miscellaneous Pacific	0.073	0.066	0.062	0.070	0.074	0.069
USA	31.871	34.069	38.259	40.484	40.307	36.998
Uzbekistan	0.382	0.604	0.371	0.240	0.380	0.395
Vanuatu	0.002	0.002	0.002	0.003	0.003	0.002
Venezuela	0.711	0.558	0.695	1.473	0.868	0.861
Viet Nam	0.242	0.294	0.280	0.413	0.560	0.358
Wallis Futuna Island	0.006	0.006	0.005	0.009	0.007	0.007
Yemen	0.202	0.188	0.190	0.277	0.140	0.200
Yugoslavia	0.127	0.236	0.204	0.131	0.111	0.162
Zambia	0.001	0.001	0.001	0.000	0.017	0.004
Zimbabwe	0.019	0.053	0.023	0.015	0.033	0.029
Other areas, not else specified[1]	0.886	1.284	1.505	1.894	1.676	1.449
Grand total	314	332	354	341	337	336

[1]: *'Other areas nes' includes 'Europe EU nes','Middle East nes', 'Other Europe nes', 'Other Africa nes', 'Oceania nes',
' Neutral zone', 'For ships' and 'Areas nes' as defined in the PC-TAS database.*

Appendix XV.   Average annual net virtual water import by country (1995-99)

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Afghanistan	7	0	7
Albania	131	32	99
Algeria	1149	40	1109
Andorra	91	0	91
Angola	323	0	323
Anguilla	0.1	0	0.1
Antigua Barbados	14	0	14
Argentina	1085	11785	-10701
Armenia	18	17	1
Aruba	28	0	28
Australia	1016	39789	-38773
Austria	1468	2955	-1488
Azerbaijan	115	35	80
Bahamas	112	0	112
Bahrain	323	0	323
Bangladesh	173	461	-288
Barbados	102	5	97
Belarus	133	412	-279
Belgium-Luxembourg	4488	8182	-3695
Belize	18	0	18
Benin	45	0	45
Bermuda	43	0	43
Bhutan	0.2	0	0.2
Bolivia	235	154	81
Bosnia Herzegovina	677	0	677
Brazil	5091	12263	-7172
British Indian Ocean Territory	0.1	0	0.1
British Virgin Islands	3	0	3
Brunei	153	0	153
Bulgaria	573	0	573
Burkina Faso	16	0	16
Burundi	2	0	2
Cambodia	50	0	50
Cameroon	21	0	21
Canada	7025	18276	-11251
Cape Verde	23	0	23
Cayman Islands	38	0	38
Central African Republic	2	0	2

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Chad	2	0	2
Chile	2479	320	2159
China	6483	6982	-499
Christmas Is	1	0	1
Cocos Islands	0.0	0	0.0
Colombia	506	624	-118
Comoros	61	0	61
Congo	131	0	131
Congo, D.R.	127	0	127
Cook Islands	9	0	9
Costa Rica	306	817	-512
Cote d'Ivoire	130	0	130
Croatia	968	321	647
Cuba	315	0	315
Cyprus	106	84	23
Czech Republic	657	1346	-689
Denmark	1842	7623	-5781
Djibouti	14	0	14
Dominica	7	0	7
Dominican Republic	1197	0	1197
Ecuador	107	59	48
Egypt	3045	148	2897
El Salvador	685	74	611
Equatorial Guinea	11	0	11
Eritrea	2	0	2
Estonia	230	443	-212
Ethiopia	3	0	3
Faeroe Islands	22	0	22
Falkland Islands	2	0	2
Fiji	172	0	172
Finland	436	668	-233
France	12464	17367	-4902
French Guiana	10	0	10
French Polynesia	185	0	185
French Southern Ant. Territory	1	0	1
Gabon	181	0	181
Gambia	10	1	10
Georgia	62	0	62
Germany	16433	17379	-946

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Ghana	139	0	139
Gibraltar	24	0	24
Greece	3237	631	2606
Greenland	27	0	27
Grenada	15	0	15
Guadeloupe	26	0	26
Guatemala	418	253	165
Guinea	26	0	26
Guinea Bissau	4	0	4
Guyana	33	0	33
Haiti	61	0	61
Honduras	181	118	63
Hong Kong	17224	575	16648
Hungary	851	1858	-1007
Iceland	6	22	-16
India	2025	5787	-3762
Indonesia	5372	448	4924
Iran	1020	0	1020
Iraq	297	0	297
Ireland	785	8949	-8164
Israel	1673	219	1454
Italy	34085	10060	24026
Jamaica	276	0	276
Japan	30131	1189	28942
Jordan	883	322	561
Kazakhstan	159	0	159
Kenya	16	0	16
Kiribati	8	0	8
Kuwait	902	0	902
Kyrgyzstan	14	58	-44
Laos	17	0	17
Latvia	255	197	58
Lebanon	1279	0	1279
Liberia	22	0	22
Libya	651	0	651
Lithuania	231	1334	-1103
Macau	111	7	105
Macedonia	288	0	288
Madagascar	8	69	-60

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Malawi	9	0	9
Malaysia	3611	1289	2322
Maldives	21	0	21
Mali	34	0	34
Malta	210	3	207
Marshall Islands	7	0	7
Martinique	28	0	28
Mauritania	23	0	23
Mauritius	352	63	290
Mexico	7681	3339	4342
Micronesia	13	0	13
Moldova	81	271	-190
Mongolia	17	0	17
Montserrat	0.3	0	0.3
Morocco	350	70	281
Mozambique	55	0	55
Myanmar	125	0	125
N.Caledonia	45	0	45
N.Mariana	4	0	4
Nauru	8	0	8
Nepal	4	3	1
Netherlands Antilles	159	0	159
Netherlands	10905	14954	-4049
New Zealand	326	20730	-20404
Nicaragua	77	1021	-944
Niger	16	512	-496
Nigeria	576	29	547
Niue	1	0	1
Norfolk Island	1	0	1
North Korea	67	0	67
Norway	179	360	-181
Oman	620	300	320
Pakistan	160	0	160
Palau	3	0	3
Panama	118	298	-180
Papua New Guinea	658	0	658
Paraguay	574	976	-403
Peru	668	34	635
Philippines	3763	11	3752

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Pitcairn	0.1	0	0.1
Poland	1483	3912	-2429
Portugal	4427	963	3464
Qatar	256	0	256
Reunion	25	0	25
Romania	726	880	-154
Russia	12258	3339	8919
Rwanda	8	0	8
S.Vincent-Grenadines	10	0	10
Samoa	52	0	52
Sao Tome Principe	3	0	3
Saudi Arabia	2572	301	2271
Senegal	60	36	23
Seychelles	17	0	17
Sierra Leone	6	0	6
Singapore	2430	369	2061
Slovakia	519	621	-102
Slovenia	457	553	-96
Solomon Islands	5	0	5
Somalia	2	0	2
South Africa	2003	669	1334
South Korea	17787	4365	13422
Spain	7629	6559	1070
Spec Cats	299	0	299
Sri Lanka	383	2346	-1963
St.Helena	1	0	1
St.Kitts Nevis	5	0	5
St.Lucia	30	0	30
St.Pier.Miquelon	2	0	2
Sudan	18	446	-427
Suriname	20	0	20
Sweden	1424	713	711
Switzerland-Liechtenstein	845	554	291
Syria	250	0	250
Taiwan	10666	0	10666
Tajikistan	5	0	5
Tanzania	5	68	-63
Thailand	3183	2729	454
Togo	9	6	4

Countries	Import ($10^6 m^3$/yr)	Export ($10^6 m^3$/yr)	Net import ($10^6 m^3$/yr)
Tokelau	2	0	2
Tonga	51	0	51
Trinidad Tobago	193	23	169
Tunisia	307	51	256
Turkey	2054	510	1545
Turkmenistan	106	0	106
Turks Caicos Island	3	0	3
Tuvalu	0.5	0	0.5
Uganda	4	80	-75
Ukraine	428	0	428
United Arab Emirates	2486	0	2486
United Kingdom	10732	5596	5136
Uruguay	259	6661	-6403
US miscellaneous pacific	69	0	69
USA	36998	67621	-30623
Uzbekistan	395	0	395
Vanuatu	2	0	2
Venezuela	861	409	451
Viet Nam	358	0	358
Wallis Futuna Islands	7	0	7
Yemen	200	0	200
Yugoslavia	162	169	-7
Zambia	4	0	4
Zimbabwe	29	0	29
Other areas, not else specified[1]	1449	0.0	1449
Total	335565	335565	0

[1]: *'Other areas nes' includes 'Europe EU nes','Middle East nes', 'Other Europe nes', 'Other Africa nes', 'Oceania nes', ' Neutral zone', 'For ships' and 'Areas nes' as defined in the PC-TAS database.*

Appendix XVI. Grouping of countries into thirteen world regions

North Africa	Central Africa	Middle East
Algeria	Burundi	Bahrain
Benin	Cameroon	Iran
Burkina Faso	Central African Republic	Iraq
Cape Verde	Comoros	Israel
Chad	Equatorial Guinea	Jordan
Djibouti	Gabon	Kuwait
Egypt	Kenya	Lebanon
Eritrea	Rwanda	Oman
Ethiopia	Sao Tome and Principe	Qatar
Gambia	Seychelles	Saudi Arabia
Ghana	Tanzania	Syria
Guinea	Uganda	Turkey
Guinea-Bissau	Zaire	United Arab Emirates
Ivory Coast	**Southern Africa**	Yemen
Liberia	Angola	
Libya	Madagascar	
Mali	Malawi	
Mauritania	Mauritius	
Morocco	Mozambique	
Niger	Reunion	
Nigeria	South Africa	
Senegal	St. Helena	
Sierra Leone	Zambia	
Somalia	Zimbabwe	
Sudan		
Togo		
Tunisia		
Western Sahara		

Eastern Europe	Western Europe	South East Asia
Albania	Andorra	Bangladesh
Bosnia and Herzegovina	Austria	Brunei
Bulgaria	Belgium- Luxembourg	Cambodia
Croatia	Denmark	Indonesia
Cyprus	Faroe Islands	Laos
Czech Republic	Finland	Malaysia
Estonia	France	Myanmar (Burma)
Greece	Germany	Philippines
Hungary	Gibraltar	Singapore
Latvia	Greenland	Thailand
Lithuania	Ireland	Vietnam
Macedonia	Italy	**Central and South Asia**
Poland	Malta	Afghanistan
Romania	Monaco	Bermuda
Slovakia	Netherlands	Bhutan
Slovenia	Norway	China
Yugoslavia	Portugal	India
FSU	Spain	Japan
Armenia	Svalbard	Macau
Azerbaijan	Sweden	Maldives
Byelarus	Switzerland	Mongolia
Georgia	United Kingdom	Nepal
Kazakhstan		North Korea
Kyrgyzstan		Pakistan
Moldova		South Korea
Russia		Sri Lanka
Tajikistan		Taiwan
Turkmenistan		Hong Kong
Ukraine		
Uzbekistan		

Central America	North America	Oceania
Anguilla	Canada	Australia
Antigua and Barbuda	St. Pierre and Miquelon	Christmas Island
Aruba	United States	Cocos (Keeling) Islands
Bahamas, The		Cook Islands
Barbados	**South America**	Fiji
Belize	Argentina	French Polynesia
British Virgin Islands	Bolivia	Guam
Cayman Islands	Brazil	Kiribati
Costa Rica	British Indian Ocean Territory	Marshall Islands
Cuba	Chile	Micronesia
Dominica	Colombia	Nauru
Dominican Republic	Ecuador	New Caledonia
El Salvador	Falkland Islands (Islas Malvinas)	New Zealand
Grenada	French Guiana	Niue
Guadeloupe	French Southern & Antarctic Lands	Norfolk Island
Guatemala	Guyana	Northern Mariana Islands
Haiti	Paraguay	Pacific Islands (Palau)
Honduras	Peru	Papua New Guinea
Jamaica	Suriname	Pitcairn Islands
Martinique	Uruguay	Solomon Islands
Mexico	Venezuela	Tokelau
Montserrat		Tonga
Netherlands Antilles		Tuvalu
Nicaragua		Vanuatu
Panama		Wallis and Futuna
St. Kitts and Nevis		Samoa
St. Lucia		
St. Vincent and the Grenadines		
Trinidad and Tobago		
Turks and Caicos Islands		

Appendix XVII. Gross virtual water flows between and within regions in the period 1995-99

Region		Virtual water flow ($10^6 m^3$/yr)					
Exporter	Importer	1995	1996	1997	1998	1999	Average
Central Africa	Central Africa	15.5	3.9	11.2	10.9	5.1	9.3
	Central America			0.8	0.0	0.3	0.2
	Central and South Asia	8.8	18.5	83.4	191.2	170.8	94.5
	Eastern Europe					0.3	0.1
	FSU			0.0	0.1	0.0	0.03
	Middle East	2.9	3.9	6.8	2.6	11.3	5.5
	North Africa	0.8	0.6	1.7	1.3	0.1	0.9
	North America			0.6	0.1	0.1	0.2
	Oceania				7.9	0.7	1.7
	South America						
	South-east Asia				1.4		0.3
	Southern Africa		0.9				0.2
	Western Europe						
	Areas nes[1]						
Central America	Central Africa						
	Central America	708.9	1620.3	1498.5	1009.1	1944.7	1356.3
	Central and South Asia	132.6	497.4	350.1	311.6	142.9	286.9
	Eastern Europe	1.9	1.9	0.4			0.8
	FSU	1.4	7.7	6.1	7.3		4.5
	Middle East	0.8	2.2	7.5	2.5	8.3	4.3
	North Africa						
	North America	5568.0	3101.6	3225.4	2886.1	4227.7	3801.8
	Oceania	0.1	0.2	0.1	0.1	0.8	0.3
	South America	134.7	207.9	122.9	175.4	45.0	137.2
	South-east Asia	4.0	1.3	3.8	1.2	3.2	2.7
	Southern Africa		1.0	1.2	1.2	0.2	0.7
	Western Europe	212.7	470.4	227.8	196.6	179.2	257.3
	Areas nes[1]	3.5	3.3	3.5	459.7	4.5	94.9
Central and South Asia	Central Africa	12.6	27.0	105.0	74.1	0.8	43.9
	Central America	7.5	7.3	17.5	25.2	10.7	13.6
	Central and South Asia	10009.8	12873.6	13854.9	9667.9	8432.9	10967.8
	Eastern Europe	286.1	1106.9	130.3	93.9	112.5	345.9
	FSU	1477.5	1394.6	1249.1	1150.2	283.8	1111.1
	Middle East	2586.2	2613.8	2626.2	2876.5	160.5	2172.6
	North Africa	8.9	11.5	29.2	31.1	2.7	16.7
	North America	611.0	969.2	357.7	654.6	388.9	596.3
	Oceania	126.3	78.6	57.9	57.4	12.5	66.6
	South America	26.2	37.9	51.7	74.9	91.4	56.4
	South-east Asia	3842.9	4471.4	4706.3	3655.2	1350.0	3605.2
	Southern Africa	358.1	264.4	294.4	331.7	7.9	251.3
	Western Europe	2046.8	2529.7	2654.2	1982.2	818.2	2006.2
	Areas nes[1]	0.8	0.5	0.0	0.0	0.0	0.3

Region		Virtual water flow ($10^6 m^3$/yr)					
Exporter	Importer	1995	1996	1997	1998	1999	Average
Eastern Europe	Central Africa	0.7	0.4	0.8		0.1	0.4
	Central America	24.2	36.9	40.0	43.9	29.8	35.0
	Central and South Asia	64.3	128.3	223.9	203.9	280.7	180.2
	Eastern Europe	2006.1	2438.9	2772.0	3206.6	2784.9	2641.7
	FSU	1519.0	2220.4	4277.3	3763.0	1881.6	2732.3
	Middle East	602.1	562.2	637.9	488.3	542.5	566.6
	North Africa	31.8	62.1	339.7	283.5	262.2	195.9
	North America	160.2	154.1	142.5	198.8	300.5	191.2
	Oceania	11.9	12.5	10.8	9.3	10.4	11.0
	South America	34.6	12.4	21.3	59.1	24.3	30.3
	South-east Asia	187.1	226.1	210.2	176.1	205.8	201.1
	Southern Africa	9.9	13.3	14.3	5.6	12.8	11.2
	Western Europe	6130.6	5019.0	5387.2	4862.1	5944.8	5468.8
	Areas nes[1]	68.2	144.5	223.0	121.4	12.5	113.9
FSU	Central Africa		0.036				0.007
	Central America						
	Central and South Asia	20.0	229.6	129.7	158.9	161.4	139.9
	Eastern Europe	612.6	1109.0	1323.8	883.7	623.1	910.5
	FSU	214.0	379.3	212.8	1193.3	1250.3	649.9
	Middle East	87.7	501.3	629.9	365.9	163.3	349.6
	North Africa	0.4					0.1
	North America		10.2	25.8	89.0	125.3	50.1
	Oceania						
	South America		3.2	9.4	0.8	0.7	2.8
	South-east Asia	3.1	2.3	0.7	0.6	7.5	2.9
	Southern Africa						
	Western Europe	87.7	2755.2	2691.2	2684.8	1912.5	2026.3
	Areas nes[1]			0.018	0.018	0.018	0.011
MiddleEast	Central Africa	0.1	0.0	0.3	0.0	0.0	0.1
	Central America	3.6	7.8	3.2	1.3		3.2
	Central and South Asia	72.2	125.3	118.8	213.2	117.5	129.4
	Eastern Europe	56.7	42.4	59.4	67.6	35.8	52.4
	FSU	40.1	59.5	73.4	116.9	66.5	71.3
	Middle East	1173.2	887.4	1046.1	1490.4	455.9	1010.6
	North Africa	65.8	27.7	4.4	4.9	15.7	23.7
	North America	20.3	44.5	82.0	21.7	12.9	36.3
	Oceania	0.2		0.5	0.0	0.0	0.2
	South America	5.7	14.6	0.3	0.7	0.6	4.4
	South-east Asia	25.4	15.7	7.1	1.6	2.8	10.5
	Southern Africa	1.8	3.1	0.1	0.4	0.7	1.2
	Western Europe	288.4	419.2	239.3	244.3	145.6	267.3
	Areas nes[1]	10.2	9.6	24.9	83.4	80.5	41.7

Region		Virtual water flow (10^6m^3/yr)					
Exporter	Importer	1995	1996	1997	1998	1999	Average
North Africa	Central Africa		7.1	12.1	2.3		4.3
	Central America			0.4		2.6	0.6
	Central and South Asia	56.8	10.7	65.7	64.8	17.3	43.1
	Eastern Europe	32.8	11.2	12.9	8.9	0.5	13.3
	FSU	0.3	0.5	0.1	0.9	1.4	0.6
	Middle East	419.5	431.0	664.9	606.1	77.5	439.8
	North Africa	507.8	933.5	717.3	843.9	28.0	606.1
	North America	2.2	2.7	2.7	0.2	0.4	1.6
	Oceania						
	South America	0.1	1.3	0.7			0.4
	South-east Asia	1.6					0.3
	Southern Africa	0.2		0.8			0.2
	Western Europe	273.7	243.2	209.8	284.9	74.5	217.2
	Areas nes[1]	10.9	7.1	6.8	7.8	14.7	9.5
North America	Central Africa	3.5	1.8	7.3	7.8	8.8	5.8
	Central America	4526.5	5805.5	9226.1	9878.2	10022.0	7891.7
	Central and South Asia	39194.6	40673.5	45836.3	42727.2	48213.0	43328.9
	Eastern Europe	402.2	446.1	507.5	508.8	405.4	454.0
	FSU	1188.8	1378.1	1755.0	1343.9	360.5	1205.3
	Middle East	337.2	366.9	308.2	499.6	306.9	363.8
	North Africa	442.4	274.4	401.6	428.2	435.4	396.4
	North America	14397.8	20050.1	21613.3	21562.7	18719.9	19268.7
	Oceania	124.8	160.4	301.1	234.8	284.8	221.2
	South America	530.2	470.5	648.0	692.6	545.5	577.4
	South-east Asia	4649.9	5210.8	5270.6	2508.6	3634.1	4254.8
	Southern Africa	249.0	436.7	242.5	239.7	510.0	335.6
	Western Europe	7996.6	8696.8	6110.7	8812.0	6351.2	7593.5
	Areas nes[1]						
Oceania	Central Africa	2.6	3.8	10.0	27.9	14.3	11.7
	Central America	852.6	1059.0	1431.3	1743.4	1503.4	1317.9
	Central and South Asia	19122.4	17766.1	18669.0	18120.3	19726.4	18680.8
	Eastern Europe	475.6	617.1	521.4	827.5	248.7	538.1
	FSU	439.7	486.3	803.2	1131.7	284.1	629.0
	Middle East	3472.2	4004.3	3609.9	3980.6	3704.4	3754.3
	North Africa	394.1	694.4	1146.7	1726.3	2011.5	1194.6
	North America	13890.7	12419.1	14441.6	16983.6	16913.0	14929.6
	Oceania	2319.3	2144.6	1952.8	1905.1	1940.6	2052.5
	South America	828.2	1188.0	1187.5	1158.3	713.9	1015.2
	South-east Asia	6641.2	8254.6	9676.6	6449.1	8311.8	7866.7
	Southern Africa	782.0	1005.7	1072.1	989.6	911.7	952.2
	Western Europe	5803.9	6125.2	6686.6	7488.0	6075.8	6435.9
	Areas nes[1]	730.9	1060.7	1216.9	1240.2	1452.6	1140.3

Region		Virtual water flow ($10^6 m^3$/yr)					
Exporter	Importer	1995	1996	1997	1998	1999	Average
South America	Central Africa	55.1	84.8	91.1	115.0	96.7	88.5
	Central America	381.7	566.4	837.2	680.6	1083.4	709.8
	Central and South Asia	3136.6	4080.5	4195.2	3637.1	4848.6	3979.6
	Eastern Europe	80.9	299.8	288.2	142.8	149.2	192.2
	FSU	8.2	141.3	114.1	72.7	16.3	70.5
	Middle East	1307.5	678.4	1749.3	1892.2	2013.1	1528.1
	North Africa	86.3	77.3	164.1	313.7	245.7	177.4
	North America	2176.7	2426.3	3381.9	3077.1	5105.7	3233.5
	Oceania	9.7	27.7	35.2	28.7	55.7	31.4
	South America	10596.1	11155.1	9637.8	8123.2	7742.9	9451.0
	South-east Asia	558.3	626.8	853.5	443.9	702.4	637.0
	Southern Africa	88.1	159.6	219.3	100.4	157.6	145.0
	Western Europe	12211.6	11910.3	12701.0	13487.2	14431.9	12948.4
	Areas nes[1]	75.5	82.3	106.1	75.8	121.8	92.3
South East Asia	Central Africa	1.7	1.9	3.5	4.1	3.6	2.9
	Central America	0.4	0.7	17.1	7.2	1.5	5.4
	Central and South Asia	1626.6	1489.9	1845.3	1754.6	1398.4	1623.0
	Eastern Europe	12.3	4.6	12.0	17.7	6.2	10.5
	FSU	6.0	3.0	14.0	25.2	2.2	10.1
	Middle East	7.9	6.9	10.5	25.9	17.3	13.7
	North Africa	8.8	7.9	7.3	4.1	14.6	8.5
	North America	482.4	505.0	440.4	431.5	497.6	471.4
	Oceania	53.0	47.6	61.1	49.5	65.7	55.4
	South America	24.9	15.8	31.1	37.7	29.0	27.7
	South-east Asia	1953.2	1897.5	1753.9	1515.8	1863.4	1796.8
	Southern Africa	14.0	28.3	15.9	24.1	7.9	18.0
	Western Europe	1342.5	1195.9	1397.2	1315.4	1066.4	1263.5
	Areas nes[1]	0.3	0.3	0.2	0.7	0.2	0.3
Southern Africa	Central Africa	4.8	10.3	5.9	2.9	77.5	20.3
	Central America	1.3	0.8	2.3	2.3	4.0	2.2
	Central and South Asia	76.1	69.9	84.5	80.7	545.2	171.3
	Eastern Europe	12.4	8.1	0.3	2.2	8.0	6.2
	FSU			1.8	8.9		2.1
	Middle East	13.2	16.0	6.9	4.3	74.5	23.0
	North Africa	0.3	2.4	1.6	8.7	5.8	3.8
	North America	61.1	61.7	183.0	28.3	36.7	74.2
	Oceania	0.0	0.2	0.7	2.5	4.5	1.6
	South America	0.3	0.3	0.4	0.6	10.4	2.4
	South-east Asia	15.8	13.5	13.5	8.9	77.0	25.7
	Southern Africa	54.4	59.1	56.9	28.8	305.7	101.0
	Western Europe	261.6	189.8	136.8	97.6	1149.8	367.1
	Areas nes[1]			0.3		0.4	0.1

Region		Virtual water flow ($10^6 m^3$/yr)					
Exporter	Importer	1995	1996	1997	1998	1999	Average
Western Europe	Central Africa	589.6	459.2	411.1	298.2	255.6	402.8
	Central America	954.9	671.8	819.2	636.6	764.1	769.3
	Central and South Asia	4751.2	5186.9	5830.4	5153.6	6605.0	5505.4
	Eastern Europe	6337.9	6009.4	6333.8	6691.5	6557.0	6385.9
	FSU	5394.2	7454.0	9218.2	6087.3	8282.3	7287.2
	Middle East	6275.9	5094.7	4510.3	3950.9	3086.1	4583.6
	North Africa	5269.1	4336.7	3864.2	4036.5	2784.1	4058.1
	North America	1297.3	1257.7	1327.5	1412.1	1558.1	1370.6
	Oceania	165.4	123.5	114.0	115.5	155.8	134.8
	South America	962.7	592.0	512.6	618.2	441.0	625.3
	South-east Asia	888.1	790.1	915.5	539.4	1031.3	832.9
	Southern Africa	1261.5	1226.9	1154.5	644.8	675.8	992.7
	Western Europe	69961.7	67655.5	69169.7	71126.0	70256.8	69634.0
	Areas nes[1]	461.9	399.5	49.2	337.0	371.4	323.8

[1]: *'Other areas nes' includes 'Europe EU nes', 'Middle East nes', 'Other Europe nes', 'Other Africa nes', 'Oceania nes', ' Neutral zone', 'For ships' and 'Areas nes' as defined in the PC-TAS database.*

Appendix XVIII. National water footprints, water scarcity, water self-sufficiency and water dependency (averages for the period 1995-99)

Country	Population[1]	Water withdrawal[2] (10⁶ m³/yr)	Water availability[2] (10⁶ m³/yr)	Net virtual water import (10⁶ m³/yr)		Water footprint (m³/ capita /yr)	Water scarcity (%)	Water self-suffici-ency (%)	Water depen-dency (%)
				Crop	Livestock				
Afghanistan	20240800	23105	65000	-229	7	1131	35.5	100	
Albania	3151600	1048	41700	263	99	447	2.5	74	26
Algeria	28707400	5738	14405	9804	1109	580	39.8	34	66
Andorra	75200			2	91	1235			
Angola	12047600	326	184000	168	323	68	0.2	40	60
Anguilla	10400			1	0.1	135			
Antigua and Barbuda	64200	5	52	9	14	430	9.6	18	82
Argentina	35671600	28580	814000	-45268	-10701		3.5	100	
Armenia	3780600	2925	10529	311	1	856	27.8	90	10
Aruba	90600			7	28	386			
Australia	18507400	16485	492000	-29119	-38773		3.4	100	
Austria	8077400	2169	77700	305	-1488	122	2.8	100	
Azerbaijan	7840200	16549	30275	974	80	2245	54.7	94	6
Bahamas	291800		20	-50	112	212			100
Bahrain	601000	274	116	137	323	1221	236.3	37	63
Bangladesh	129077400	72237	1210642	5742	-288	602	6.0	93	7
Barbados	265000	81	81.15	102	97	1056	99.8	29	71
Belarus	10283800	2625	58000	1221	-279	347	4.5	74	26
Belgium-Luxembourg	10608600	8779	21400	11915	-3695	1602	41.0	52	48
Belize	212200	95	18555	-85	18	131	0.5	100	
Benin	5801200	234	24800	-605	45		0.9	100	
Bermuda	61800			135	43	2880			
Bhutan	1925000	409	95000	26	0.2	226	0.4	94	6
Bolivia	7776000	1276	622531	-1057	81	39	0.2	100	
Bosnia -Herzegovina	3580800		37500	174	677	238			100
Brazil	163879600	57564	8233000	-9000	-7172	253	0.7	100	
Brunei Darussalam	308200		8500	324	153	1547			100
Bulgaria	8226200	12812	21300	-471	573	1570	60.1	99	1
Burkina Faso	10751400	760	12500	-905	16		6.1	100	
Burundi	6161400	228	3600	3	2	38	6.3	98	2
Cambodia	12082600	4035	476110	102	50	347	0.8	96	4
Cameroon	13914600	988	285500	-13	21	72	0.3	99	1
Canada	29932400	45100	2902000	-54494	-11251		1.6	100	
Cape Verde	398800	26	300	44	23	236	8.7	28	72
Cayman Islands	34400			93	38	3808			
Central African Rep.	3500400	19	144400	-1.1	2	6	0.0	98	2

Country	Population[1]	Water withdrawal[2] (10^6 m^3/yr)	Water availability[2] (10^6 m^3/yr)	Net virtual water import (10^6 m^3/yr)		Water footprint (m^3/ capita /yr)	Water scarcity (%)	Water self-suffici-ency (%)	Water depen-dency (%)
				Crop	Livestock				
Chad	7178400	220	43000	1	2	31	0.5	99	1
Chile	14619800	11272	922000	2051	2159	1059	1.2	73	27
China	1249245200	532476	2896570	20436	-499	442	18.4	96	4
Colombia	39974000	10549	2132000	6670	-118	428	0.5	62	38
Comoros	646400		1200	39	61	155			100
Congo	2764600	40	832000	315	127	174	0.0	8	92
Cook Islands	19000			0.8	9	513			
Costa Rica	3745800	2536	112400	1258	-512	876	2.3	77	23
Cote d'Ivoire	15038200	838	81000	690	130	110	1.0	51	49
Croatia	4647200		105500	224	647	187			100
Cuba	11064600	8188	38120	-222	315	748	21.5	99	1
Cyprus	761600	223	780	1065	23	1721	28.6	17	83
Czech Republic	10311000	2740	13150	485	-689	246	20.8	100	
Denmark	5267200	1236	6000	-461	-5781		20.6	100	
Djibouti	579400	8	300	109	14	227	2.7	6	94
Dominica	71000	17		-618	7				
Dominican Republic	7966000	3115	20995	-1932	1197	299	14.8	100	
Ecuador	11936400	17018	432000	-590	48	1380	3.9	100	
Egypt	64332400	61700	58300	16035	2897	1253	105.8	77	23
El Salvador	5912600	1112	25245	1048	611	469	4.4	40	60
Equatorial Guinea	421200	10	26000	1	11	55	0.0	45	55
Eritrea	3335800		6300	75	2	23			100
Estonia	1446400	158	12808	531	-212	329	1.2	33	67
Ethiopia	58398600	2781	110000	326	3	53	2.5	89	11
Faeroe Islands	44600			1	22	526			
Falkland Islands	2000			0.7	2	1382			
Fiji Islands	786600	66	28550	175	172	525	0.2	16	84
Finland	5138600	2200	110000	-173	-233	349	2.0	100	
French Guiana	148400		134000	0.4	10	71			100
French Polynesia	222200			14	185	895			
France	58593200	35631	203700	-17675	-4902	223	17.5	100	
Gabon	1138200	108	164000	100	181	342	0.1	28	72
Gambia	1191400	23	8000	155	10	158	0.3	12	88
Georgia	5315200	3559	63330	205	62	720	5.6	93	7
Germany	81917200	46328	154000	13589	-946	720	30.1	79	21
Ghana	18098200	395	53200	454	139	55	0.7	40	60
Gibraltar	27000			11	24	1280			

Country	Population[1]	Water withdrawal[2] (10⁶ m³/yr)	Water availability[2] (10⁶ m³/yr)	Net virtual water import (10⁶ m³/yr)		Water footprint (m³/ capita /yr)	Water scarcity (%)	Water self-suffici-ency (%)	Water depen-dency (%)
				Crop	Livestock				
Greece	10529400	7986	74250	-1967	2606	819	10.8	93	7
Greenland	56000		603000	1	27	507			100
Grenada	92600			30	15	488			
Guadeloupe	416400			4	26	71			
Guatemala	10526000	1909	111270	-14341	165		1.7	100	
Guinea	7695000	1461	226000	41	26	199	0.6	96	4
Guinea-Bissau	1125600	111	31000	3	4	104	0.4	94	6
Guyana	750000	1622	241000	-159	33	1995	0.7	100	
Haiti	7767400	985	14025	389	61	185	7.0	69	31
Honduras	5940600	796	95929	467	63	223	0.8	60	40
Hong Kong	6575500			2868	16648	2968			
Hungary	10120600	6810	104000	-3954	-1007	183	6.5	100	
Iceland	272200	151	170000	63	-16	725	0.1	76	24
India	959940000	620808	1896660	-32199	-3762	609	32.7	100	
Indonesia	203488000	80704	2838000	20227	4924	520	2.8	76	24
Iran	66942000	72661	137510	5820	1020	1188	52.8	91	9
Iraq	21186400	42800	75420	1097	297	2086	56.7	97	3
Ireland	3683200	711	52000	744	-8164		1.4	100	
Israel	5637400	1709	1670	4598	1454	1377	102.3	22	78
Italy	57438000	43042	191300	12864	24026	1392	22.5	54	46
Jamaica	2513400	404	9404	256	276	372	4.3	43	57
Japan	126161000	88828	430000	59444	28942	1405	20.7	50	50
Jordan	4530200	1007	880	4481	561	1335	114.5	17	83
Kazakhstan	16437400	34673	109610	-7834	159	1642	31.6	100	
Kenya	28688800	1491	30200	800	16	80	4.9	65	35
Kiribati	79600			0.3	8	100			
Kuwait	1740200	414	20	498	902	1042	2070.0	23	77
Kyrgyzstan	4698200	10042	20580	47	-44	2138	48.8	100	0
Laos	4919400	2767	333550	92	17	585	0.8	96	4
Latvia	2471800	285	35449	248	58	239	0.8	48	52
Lebanon	3310800	1474	4407	747	1279	1057	33.4	42	58
Liberia	2343000	112	232000	66	22	85	0.0	56	44
Libya	4960400	5725	600	744	651	1435	954.2	80	20
Lithuania	3707400	266	24900	116	-1103		1.1	100	
Macau	431878			96	105	465			
Macedonia	1992400		6400	51	288	170			100
Madagascar	14637400	14476	337000	188	-60	998	4.3	99	1

Country	Population[1]	Water withdrawal[2] (10^6 m^3/yr)	Water availability[2] (10^6 m^3/yr)	Net virtual water import (10^6 m^3/yr)		Water footprint (m^3/ capita /yr)	Water scarcity (%)	Water self-suffici-ency (%)	Water depen-dency (%)
				Crop	Livestock				
Malawi	10491200	937	17280	-761	9	18	5.4	100	
Malaysia	20905400	8581	580000	10252	2322	1012	1.5	41	59
Maldives	266000	3	30	12	21	136	11.2	9	91
Mali	10470200	6908	100000	65	34	669	6.9	99	1
Malta	383200	63	50.5	272	207	1414	124.9	12	88
Marshall Islands	49000			2	7	189			
Martinique	376600			-10	28	48			
Mauritania	2424800	1630	11400	375	23	837	14.3	80	20
Mauritius	1133600	453	2210	290	290	910	20.5	44	56
Mexico	94259600	77808	457222	8987	4342	967	17.0	85	15
Micronesia	114000			9	13	195			
Moldova	4321800	2951	11650	-373	-190	553	25.3	100	
Mongolia	2463000	431	34800	15	17	188	1.2	93	7
Montserrat	7600			-40	0.3				
Morocco	28268800	12225	29000	5530	281	638	42.2	68	32
Mozambique	17154200	615	216110	252	55	54	0.3	67	33
Myanmar	45757200	28258	1045601	-3480	125	544	2.7	100	
New Caledonia	202000			20	45	321			
N. Mariana	64000			5	4	139			
Nauru	11400			0.2	8	708			
Nepal	21459000	10067	210200	29	1	470	4.8	100	0
Netherlands Antilles	209600			52	159	1008			
Netherlands	15631200	7848	91000	29540	-4049	2133	8.6	24	76
New Zealand	3679200	2006	327000	888	-20404		0.6	100	
Nicaragua	4681000	1288	196690	251	-944	127	0.7	100	
Niger	9767600	2170	33650	202	-496	192	6.4	100	
Nigeria	105012200	7177	286200	4862	547	120	2.5	57	43
Niue	2000				0.7	348			
North Korea	21761000	8784	77135	641	67	436	11.4	93	7
Norway	4405000	2096	382000	2204	-181	935	0.5	51	49
Oman	2304200	1302	985	1108	320	1185	132.2	48	52
Pakistan	130450000	166839	222685	-10	160	1280	74.9	100	0
Palau	18000			4	3	406			
Panama	2721800	722	147980	209	-180	276	0.5	96	4
Papua New Guinea	4489400	52	801000	28	658	164	0.0	7	93
Paraguay	5090600	445	336000	-8425	-403		0.1	100	
Peru	24374000	19046	1913000	5423	635	1030	1.0	76	24

Country	Population[1]	Water withdrawal[2] (10^6 m^3/yr)	Water availability[2] (10^6 m^3/yr)	Net virtual water import (10^6 m^3/yr)		Water footprint (m^3/ capita /yr)	Water scarcity (%)	Water self-sufficiency (%)	Water dependency (%)
				Crop	Livestock				
Philippines	71263600	27663	479000	965	3752	454	5.8	85	15
Pitcairn	71263600	27663	479000	0.03	0.1	388	5.8	100	0
Poland	38627600	12280	61600	3758	-2429	352	19.9	90	10
Portugal	9954400	7395	68700	6228	3464	1717	10.8	43	57
Qatar	533800	285	53	59	256	1126	538.3	47	53
Reunion	687000		5000	62	25	127			100
Romania	22564600	24893	211930	-1824	-154	1016	11.7	100	
Russian Federation	147257400	75632	4507250	2455	8919	591	1.7	87	13
Rwanda	5888200	71	5200	93	8	29	1.4	41	59
Saint Vincent/ Grenadines	111200	10		56	10	687			
Samoa	158000			-0.5	52	328			
Sao Tome &Principe	130400		2180	3	3	49			100
Saudi Arabia	18303200	17134	2400	10878	2271	1655	713.9	57	43
Senegal	8734400	1544	39400	2637	23	481	3.9	37	63
Seychelles	77000			28	17	587			
Sierra Leone	4151800	382	160000	83	6	114	0.2	81	19
Singapore	3697200		600	3404	2061	1478			100
Slovakia	5381600		50100	-591	-102			100	
Slovenia	1993200		31870	1041	-96	474			100
Solomon Islands	404200		44700	-1.3	5	9			100
Somalia	7829800	3306	13500	277	2	458	24.5	92	8
Spain	39823800	35904	111500	16504	1070	1343	32.2	67	33
Sri Lanka	18396400	12133	50000	85693	-1963	5211	24.3	13	87
Saint Helena				1	0.8				
Saint Kitts Nevis	39400		23.6	0.9	5	159			100
Saint Lucia	142800			-1041	30				
St. Pierre Miquelon	7000			0.1	2	331			
South Africa	41425200	13755	50000	4369	1334	470	27.5	71	29
South Korea	45690800	17785	69700	22514	13422	1176	25.5	33	67
Sudan	29183400	37069	64500	-1151	-427	1216	57.5	100	
Suriname	412000	666	122000	-87	20	1455	0.5	100	
Sweden	8848600	2928	174000	-840	711	316	1.7	100	
Switzerland	7153000	1190	53500	1936	291	478	2.2	35	65
Syrian Arab Republic	14991200	19768	26260	-4379	250	1043	75.3	100	
Taiwan				7032	10666				
Tajikistan	5888800	11874	15980	-37	5	2011	74.3	100	
Tanzania	32601800	1917	91000	928	-63	85	2.1	69	31

Country	Population[1]	Water withdrawal[2] (10⁶ m³/yr)	Water availability[2] (10⁶ m³/yr)	Net virtual water import (10⁶ m³/yr)		Water footprint (m³/ capita /yr)	Water scarcity (%)	Water self-suffici-ency (%)	Water depen-dency (%)
				Crop	Livestock				
Thailand	60368600	82225	409944	-46665	454	597	20.1	100	
Togo	4106600	146	14700	637	4	192	1.0	19	81
Tokelau	1400			0.01	2	1242			
Tonga	98000			4	51	556			
Trinidad and Tobago	1276200	297	3840	589	169	827	7.7	28	72
Tunisia	9160600	2578	4560	3867	256	732	56.5	38	62
Turkey	63596400	35814	229300	2053	1545	620	15.6	91	9
Turkmenistan	4425000	24527	24720	57	106	5580	99.2	99	1
Turks Caicos Islands	15200			0.2	3	206			
Tuvalu	9800				0.5	50			
Uganda	21340200	196	66000	-86	-75	2	0.3	100	
Ukraine	50828400	38136	139550	-6364	428	634	27.3	100	
United Arab Emirates	2457600	2232	150	1691	2486	2608	1488.2	35	65
United Kingdom	59170400	11717	147000	-970	5136	268	8.0	74	26
Uruguay	3265400	3091	139000	-2401	-6403			2.2	100	
US misc. Pacific				18	69				
USA	274602600	480488	3069400	-151660	-30623	1086	15.7	100	
Uzbekistan	23645600	58051	50410	409	395	2489	115.2	99	1
Vanuatu	182000			0.1	2	13			
Venezuela	22776000	6138	1233170	4926	451	506	0.5	53	47
Viet Nam	75029200	55951	891210	-18032	358	510	6.3	100	
Wallis Futuna Islands	14000			-0.3	7	452			
Yemen	16252800	6425	4100	1437	200	496	156.7	80	20
Yugoslavia	10551500		208500	-136	-7			100	
Zaire	47241600	386	1283000	87	131	13	0.0	64	36
Zambia	9702200	1708	105200	-98	4	166	1.6	100	
Zimbabwe	11938400	2499	20000	-518	29	168	12.5	100	

1: Average for the period 1995-99, from FAOSTAT (FAO, 2003b).

2: Source AQUASTAT2000 (FAO, 2003a).

Appendix XIX.   Glossary

Virtual water

Virtual water content – The virtual water content of a product is the volume of water used to produce the product, measured at the place where the product was actually produced (*production site specific definition*). The virtual water content of a product can also be defined as the volume of water that would have been required to produce the product in the place where the product is consumed (*consumption site specific definition*). [In this study we use the production site specific definition.]

Virtual water export – The virtual water export of a country or region is the volume of virtual water associated with the export of goods or services from the country or region. It is the total volume of water required to produce the products for export.

Virtual water import – The virtual water import of a country or region is the volume of virtual water associated with the import of goods or services into the country or region. It is the total volume of water required (in the export countries) to produce the import products. Viewed from the perspective of the importing country, this water can be seen as an additional source of water that comes on top of the domestically available water resources.

Virtual water flow – The virtual water flow between two nations or regions is the volume of virtual water that is being transferred from one place to another as a result of product trade.

Virtual water balance – The virtual water balance of a country over a certain time period is defined as the net import of virtual water over this period, which is equal to the gross import of virtual water minus the gross export. A positive virtual water balance implies net inflow of virtual water to the country from other countries. A negative balance means net outflow of virtual water.

Virtual water import dependency – Countries with net import of virtual water depend, de facto, on the water resources available in other parts of the world. The virtual water import dependency of a country or region is defined as the ratio of the net virtual water import of the country or region to its total water footprint.

Water footprint

Nation's water footprint – The water footprint of a nation is defined as the total amount of water that is used to produce the goods and services consumed by the inhabitants of the nation. The footprint is generally expressed in terms of the volume of water use *per year*. The national water footprint can be assessed in two ways. The bottom-up approach is to consider the sum of all goods and services consumed multiplied with their respective virtual water content. It should be noted that the virtual water content of one particular consumption good can

vary as a function of the place and conditions of production. In the top-down approach, the water footprint of a nation can be calculated as the total use of domestic water resources plus the net virtual water import.

Individual water footprint – The water footprint of an individual is defined as the total water used for the production of the goods and services consumed by the individual. It can be estimated by multiplying all goods and services consumed by their respective virtual water content.

Blue water footprint vs. green water footprint – The total water footprint of a nation or individual falls apart into two components: the blue and the green water footprint. The blue water footprint is the volume of water withdrawn from the global blue water resources (surface water and ground water) to fulfil the national or individual demand for goods and services. The green water footprint is the volume of water used from the global green water resources (water stored in soil as soil moisture) to fulfil the demand for goods and services.

Total water footprint vs. evaporative water footprint – The total water footprint includes all green and blue water use, also the parts of the blue water withdrawals that return to the groundwater and surface water system in the form of return flows. It is useful to include these return flows in the total water footprint, because although returning they are not always reusable due to pollution. The 'evaporative' or 'consumptive' water footprint is more narrowly defined, as the total volume of water that is used for the production of goods and services and lost to the atmosphere through evapo(transpi)ration.

The water footprint within the country vs. the water footprint outside the country – The total water footprint of a country falls apart into two components: the part of the footprint that falls inside the country and the part of the footprint that presses on other countries in the world. The distinction refers to the difference between the use of domestic water resources versus the use of foreign water resources.

Assessing the virtual water content of processed products

Product tree – A product tree is a symbolic representation of how various (secondary, tertiary, etc.) products are obtained from one primary product.

Product fraction – A product fraction indicates how much secondary (tertiary, etc.) product (in ton) is obtained from one ton of primary (secondary, etc.) product.

Primary products – Primary products are the products derived directly from our natural resource base. They are for instance the crops harvested from the land or the raw milk, raw skin and carcass derived from a cow.

Secondary (tertiary, etc.) products – Secondary products and so on are the products obtained from processing a primary product. Secondary products are for instance bread (from the primary product wheat), cheese and butter (from the primary product milk) and meat and sausage (from the primary product carcass). A tertiary product is for instance boneless meat (from the secondary product meat).

Value fraction – Suppose that one product is processed into two or more derived products. In such a case, the value fraction of one derived product is the ratio of the market value of this derived product to the sum of market values of all derived products. Value fractions are used to determine how the total virtual water content of a parent product is distributed over its various derived products.

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IHE Delft
P.O. Box 3015
2601 DA Delft
The Netherlands

Website   www.ihe.nl
Phone   +31 15 2151715

National Institute for Public Health
and the Environment

Delft Cluster