IMPLEMENTATION OF THE COMPARTMENTALISATION CONCEPT: PRACTICAL EXPERIENCE AND PERSPECTIVES

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Summary: *At the 72nd OIE General Session, 2004, the General Assembly adopted the concept of compartmentalisation, a procedure that can be used to define and manage an animal subpopulation of specified animal health status in accordance with recommendations in the* Terrestrial Animal Health Code *and the* Aquatic Animal Health Code*. Compartmentalisation can be used as a tool in the prevention, management or eradication of animal disease and to provide a basis for the continued export of animals and their products after a country experiences an outbreak of disease. Following the adoption of the compartmentalisation concept the OIE developed guidelines on its application.*

The use of compartmentalisation has been rather limited. There are few examples of importing countries recognising the compartments of exporting countries for trade purposes and this has probably made the use of compartmentalisation a less attractive option. In addition, the OIE has continued to adopt other concepts and approaches that Member Countries can use to facilitate international trade, such as the definition of safe commodities.

This article explains the OIE approach to compartmentalisation and presents the experience and perspectives of Member Countries during the past ten years. Factors that support the use of compartmentalisation and those that may limit its practicability are discussed. Finally, some options to encourage the use of compartmentalisation are proposed for consideration.

Key words: *Americas – animal production –* Aquatic Animal Health Code *– compartmentalisation –* Terrestrial Animal Health Code

Introduction

The OIE *Terrestrial Animal Health Code* (‘*Terrestrial Code*’) [16] and *Aquatic Animal Health Code* (‘*Aquatic Code*’) [17] set out standards for the improvement of animal health and welfare and veterinary public health worldwide, including health measures for safe international trade in terrestrial and aquatic animals and derived products. Veterinary Authorities and Competent Authorities responsible for aquatic animal health should apply the health measures in the *Terrestrial Code* and *Aquatic Code* to provide for the early detection, reporting and control of agents that are pathogenic to animals and, in the case of zoonoses, for humans, and to prevent the transfer of diseases via international trade in animals and animal products. The application of the OIE standards and recommendations provides for safe international trade while avoiding unjustified trade barriers relating to animal and public health.

The rule-based international trade system of the World Trade Organization (WTO) came into being with the signing of the Marrakech Agreement in 1994 [22]. The WTO Agreement on the Application of Sanitary and Phytosanitary Measures (SPS Agreement) deals with measures for the protection of human, animal or plant life or health [23]. Article 3 of the SPS Agreement (‘harmonisation’)

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encourages Members to base their health measures on international standards, guidelines or recommendations. In the case of animal diseases and zoonoses, the standards in the *Codes* and *Manuals*, and other OIE guidelines and recommendations are relevant.

The OIE has published several documents to help Member Countries to understand and apply the standards in the *Terrestrial Code* and *Aquatic Code*. One such document, entitled 'International trade: Rights and Obligations of OIE Member Countries' [5] identifies approaches to facilitate safe trade. This paper notes that many countries face major challenges in the eradication of diseases from the national territory. Recognising this fact and consistent with the SPS principle of 'adaptation to regional conditions' or 'regionalisation' (Article 6) the OIE developed procedures for zoning and compartmentalisation of diseases. These approaches allow countries to define animal sub-populations that are free defined diseases and to establish conditions for trade in animals and products from these subpopulations, even though the country has not achieved national disease freedom.

Terrestrial Code Chapters 4.3 and 4.4 and *Aquatic Code* Chapters 4.1 and 4.2 contain the OIE recommendations on zoning and compartmentalisation. Guidance on the application of compartmentalisation in practice use is available on the OIE internet site:

1) Checklist on the practical implementation of compartmentalisation, published in 2012 [6], and

2) Compartmentalisation for avian influenza and Newcastle Disease, published in 2007 [7].

To convince an importing country to base its health measures on the existence of a disease free compartment, the exporting country must be able to demonstrate that the compartment complies with the OIE recommendations, based on detailed documentation. To recognise a compartment, the importing country needs a high level of confidence in the Veterinary Authority or Competent Authority for aquatic animal health of the exporting country. Exporting countries must be able to demonstrate a high level of transparency with respect to disease reporting and the auditing of the surveillance and control procedures on which the compartment is based. Engagement with the OIE in the PVS Pathway for the strengthening of Veterinary Services and Aquatic Animal Health Services can be useful for that purpose.

A brief history of the development of compartmentalisation

At the 72nd OIE General Session (2004), the International Committee (now known as the World Assembly of Delegates) adopted the concept of compartmentalisation by way of amendments to existing chapters on zoning and regionalisation [8]. These texts are found in Section 4 of the *Codes*, with the recommendations on disease prevention and control, which reflects the fact that the application of zoning and compartmentalisation is not limited to international trade. Rather, it is of general relevance to animal health.

In October 2004, the Bureau of the Aquatic Animal Health Standards Commission (AAHSC) reported on the possible uses of compartmentalisation in aquatic animals [9]. In relation to the management of disease risk in the aquatic environment the AAHSC identified the following situations where compartmentalisation could be considered.

i) a group of coastal farms under a common biosecurity management system, considered as one epidemiological unit due to their geographical localisation and distance from other groups of farms;

ii) one individual continental farm that is considered as one epidemiological unit because it is not influenced by the aquatic animal health status in the water catchment area to which its effluent drains;

iii) more than one farm, provided that each farm complies with point ii), and where all farms are under a common biosecurity management system.

For example, a compartment for salmon production may comprise a hatchery that supplies fertilised eggs to smolt farms, which, in turn supply fish to growing farms. Each of the different units complies with the requirements under ii). All farms are under a common biosecurity management system. No live aquatic animals enter the compartment from farms that are not a part of the compartment.

In the report of its January 2005 meeting [10], the Terrestrial Animal Health Standards Commission (TAHSC) reported on possible uses of compartmentalisation. The TAHSC noted that this procedure could be useful in the context of highly pathogenic avian influenza (HPAI), where zoning is impractical due to disease risks associated with the exposure of 'backyard' domestic poultry to wild birds. In addition, the TAHSC noted that compartmentalisation could be used in the context of classical swine fever (CSF), based on the biosecure separation of intensive pig farms from traditional free range pigs, which may commingle with wild and feral pig populations.

The TAHSC noted that the systematic management of biosecurity at all steps in the production chain including feed production, breeding, fattening and slaughter, with identification of critical control points and audit procedures, could provide for safe trade of products from countries that are not free from diseases such as HPAI and CSF.

In 2006, a concept paper on compartmentalisation prepared by the Scientific Commission on Animal Diseases was published in the OIE *Bulletin* for information of Member Countries and to serve as the basis for revision of the *Terrestrial Code* chapter on zoning and compartmentalisation [11].

In the report of its October 2006 meeting, the TAHSC requested that the Scientific Commission for Animal Diseases evaluate the incorporation of the compartmentalisation concept into specific disease chapters of the *Terrestrial Code* where applicable [12].

In 2007 and in 2012 the OIE published checklists [6, 7] to assist the Veterinary Authority of Member Countries and private sector companies to interpret and comply with the relevant OIE standards in terrestrial animal sectors. In addition to the requirements of *Terrestrial Code* Chapters 4.3 and 4.4, countries seeking to establish a compartment must comply with the recommendations in relevant disease chapters and with general recommendations on disease surveillance (Chapters 1.4 and 1.5) and on identification and traceability (Chapters 4.1 and 4.2).

The incorporation of references to compartmentalisation in the Terrestrial *Code* has proceeded steadily. In the 2014 edition of the *Terrestrial Code* [16], there is provision for the use of compartmentalisation for most of the diseases that are important to international trade, as illustrated in Table 1. In the *Aquatic Code* [17] the chapters on all the listed diseases of aquatic animals make reference to compartmentalisation.

Table 1
Compartmentalisation in disease chapters (*Terrestrial Code* 2014)

Disease	Compartmentalisation addressed?
African swine fever, classical swine fever	Yes
Avian influenza, Newcastle disease	Yes
Equine influenza	Yes
Foot and mouth disease (FMD), bovine spongiform encephalopathy (BSE), contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR)	Yes
Scrapie	Yes
Tuberculosis, enzootic bovine leukosis	Yes (bovine and cervid tuberculosis)
Aujeszky's disease	No
Bluetongue, West Nile fever, Rift Valley fever	No
African horse sickness (AHS), contagious equine metritis (CEM), dourine, equine infectious anaemia (EIA), piroplasmosis, equine encephalitis, equine herpesvirus 1 (EHV1), equine viral arteritis (EVA), glanders,	No
Brucella abortus, *B. melitensis*, *B. suis*.	No
Infectious bovine rhinotracheitis (IBR), trichomonosis, genital campybacteriosis	No
Infectious bronchitis (IB), infectious laryngotracheitis (ILT), mycoplasmosis, pullorum disease, infectious bursal disease (IBD)	No
Diseases of honey bees	No
Trichinellosis	No

The application of compartmentalisation

Compartment is defined in the *Terrestrial Code* [24] as:

> 'an animal subpopulation contained in one or more establishments under a common biosecurity management system with a distinct health status with respect to a specific disease or specific diseases for which required surveillance, control and biosecurity measures have been applied for the purpose of international trade.'

The definition in the *Aquatic Code* [25] is as follows:

> 'Compartmentalisation means one or more aquaculture establishments under a common biosecurity management system containing an aquatic animal population with a distinct health status with respect to a specific disease or diseases for which required surveillance and control measures are applied and basic biosecurity conditions are met for the purpose of international trade. Such compartments must be clearly documented by the Competent Authority/ies.'

A compartment is defined primarily by management and husbandry practices, based on a Biosecurity Plan, while a zone is defined primarily on a geographical basis. However, in practice, spatial considerations, management and biosecurity measures are important in the application of both zoning and compartmentalisation.

The OIE recommendations on compartmentalisation cannot be applied in all situations. The effective implementation of this concept depends on many factors, including the epidemiology of the diseases of interest; country factors, environmental factors, the required biosecurity measures, the health status of animals in areas adjacent to the compartment, surveillance and the relationship between the public and private sectors.

To date, compartmentalisation has mainly been applied in vertically integrated intensive farming systems, i.e. production of chickens and pigs. The concept is also relevant to aquaculture: a disease-free compartment for the production of shrimp has been established in Indonesia and compartments for farmed salmon are being developed in Chile and in Canada.

Experiences and perspectives of Member Countries

Table 2 lists Member Countries that have established compartments. This information was obtained by direct enquiry to the National Delegate or from publicly available sources.

As shown in the table, four of the eight countries that have experience in the use of compartmentalisation are in the Region of the Americas (Brazil, Chile, Colombia and Uruguay). The remaining four countries are in Asia (Indonesia and Thailand), Europe (United Kingdom) and Africa (Zimbabwe). Nine types of compartment were identified. Five were defined for avian influenza and/or Newcastle disease in poultry; two were defined for pork production (various diseases); one for aquatic animals and one for sheep (Uruguay). The first compartment based on the OIE standards appears to have been in Thailand (2008). The farms that were the central feature of the compartments for pork production, in Chile and Zimbabwe, both closed due to issues unrelated to animal health.

Table 2 indicates that four compartments were recognised for the purposes of trade. Of these, two are exporting poultry genetic material (Colombia, United Kingdom), one is exporting shrimp brood stock (Indonesia) and one was exporting pig meat but closed in 2000 (Zimbabwe).

In some cases compartments are authorised by a specific legal instrument (Chile, Colombia, United Kingdom and Uruguay) but in other cases authority is found in the general veterinary legislation (Zimbabwe) or a Memorandum of Understanding between the Veterinary Services and the private sector (Thailand). The European Union has adopted specific legislation on the approval of poultry and other captive bird compartments with respect to avian influenza.

The legal authority to establish a disease-free compartment is also relevant to the process of recognition; if a country does not have an appropriate legal base this may also present problems to the recognition of a compartment in an exporting country for the purpose of international trade.

With particular reference to the Americas, private sector veterinarians are involved in the surveillance and monitoring of the health of animals in compartments. For this purpose, they must be accredited by the Veterinary Authority, based on relevant statutory instruments. If the diseases for which the compartments are defined are exotic to the country the analysis of diagnostic samples is normally carried out in official laboratories. Vaccination for the diseases included in the definition of a compartment is generally prohibited, except that the vaccination of broiler chicken parent flocks for Newcastle disease could be permitted in some poultry compartments.

Table 2
Experience in the use of compartmentalisation

Country / disease	Production	Size of operation	External recognition?	Legal base	Date of approval
Brazil: AI and ND	Breeding, production and slaughter of broiler chickens – 3 companies	3 compartments; total 42 breeder farms and 371 broiler farms.	No.	General animal health legislation	
Brazil: AI and ND	Production of poultry genetic material.	1 compartment with 6 farms.	No.		
Chile: FMD, CSF, ASF, Aujeszky's disease. All exotic; no vaccination	Pigs – breeders and export of pork.	1 compartment with 1 farm, 200K sows – 500K pigs in total.	No. Plant closed while negotiations ongoing.	SAG Resolutions 8309/2011 (general) [32] and 393/2012 (specific to compartment)	January 2012. Closed mid 2013 for reasons not related to animal health.
Colombia: highly pathogenic Newcastle disease	Poultry genetic material – one company, with parent and grandparent flocks.	2 compartments, with a capacity for 75K and 150K birds total in 6 farms.	Yes. Ecuador (day-old chicks)	Circular 18/2012 – imports. Resolution 219/2012 [30]	March 2013
Indonesia: 9 diseases of crustaceans	*Penaeus vannamei* breeding and broodstock farm	2 separate sites	Yes. Malaysia, Vietnam		February 2013
Thailand: AI and ND	Broiler chickens and meat type ducks. Several companies.	61 compartments. 297 farms. 78.3 million chickens per crop.	No. Discussion under way with EU and Japan.	MOU between Dept. of Livestock Development (DLD) and commercial poultry companies	First compartment was approved in 2008.
United Kingdom: AI and ND	One company, with poultry grandparents and great grandparents.	57 approved premises.	Yes. South Africa New Zealand. EU in process.	EC 616/2009 (AI) 'Poultry Compartments (Fees)'	July 2010
Uruguay: FMD (country is free with vaccination)	Sheep – FMD free without vaccination. Goal is export of bone-in lamb.	1 farm, 1,500 lambs. Uruguay Wool Secretariat	No.	Resolution 82/2014 [3]	May 2014
Zimbabwe: ASF	Swine reproduction and pork for export	1 farm with 5 units, 2500 sows, 30 boars	Yes. Namibia (fresh pork) and South Africa (processed pork)	Animal Health (African Swine Fever) Regulations 1994	2000. Closed for reasons not related to animal health.

Experience with compartmentalisation in the poultry sector

Based on the OIE approach, in 2009 the European Union (EU) adopted a Decision on compartmentalisation in poultry, which was considered to be consistent with the EU Animal Health Strategy (2007–2013) [2]. The preamble to the relevant Regulation (EC 616/2009) notes that compartmentalisation puts the focus on precautionary measures, disease surveillance, controls and research, to reduce the incidence of animal disease and minimise the impact of outbreaks. Compartmentalisation would encourage farmers to apply biosecurity measures and would facilitate safe trade.

Regulation EC 616/2009 implements Council Directive 2005/94/EC on the approval of poultry compartments and associated biosecurity measures. Directive 2005/94/EC defines a poultry

compartment as 'a holding or holdings under a common biosecurity management system containing poultry with a distinct health status with respect to avian influenza and subjected to appropriate surveillance, control and biosecurity measures.' Duties of the Compartment manager (private sector) and of the Competent Authority are listed. Before granting approval for a compartment, the Competent Authority must ensure that specific protection and approved surveillance for avian influenza has been carried out for at least six months without detecting the presence of avian influenza in any holding within the compartment. Information on approved compartments and any related decisions should be made available via Internet-based information pages.

The EU technical provisions are generally consistent with the OIE recommendations.

The Great Britain Enhanced Scheme of compartmentalisation, which covers both Newcastle disease and avian influenza, is available to poultry breeding companies that have administrative headquarters in Great Britain [1]. Several companies have considered the possibility of seeking approval, but so far only one company has completed the process. Fifty seven premises have been approved to date.

In the United Kingdom, unlike Brazil, there is no interest in the establishment of compartments for commercial broiler production due to the relatively small size of the United Kingdom export trade in broiler meat and the high associated costs.

The approved poultry compartments in the United Kingdom and Colombia produce a commodity of high unit value – poultry genetic material – while the compartments in Brazil and Thailand produce commercial broiler chickens. It may be easier to obtain official recognition of compartments that produce genetic material as these businesses usually have biosecurity policies and practices that provide a sound starting point for compartmentalisation. As noted in the report of the TAHSC's March 2006 meeting [15], compartmentalisation should adopt existing management procedures associated with biosecurity and enhance them as necessary, rather than simply adding new layers of management. The difficulty in obtaining recognition from trading partners is a factor in the decision making process of private companies. Setting up a compartment requires companies to make a significant financial investment and an ongoing commitment to training and maintaining the skills of the workforce. The value of the products exported does not increase as a direct result of implementing a compartment. Rather, compartmentalisation is a type of 'insurance' to protect export markets in the event that the country experiences an outbreak of disease, with the main concern being avian influenza. If continued access to export markets cannot be guaranteed it can be rather difficult for a company to justify the investment. On the other hand, companies that produce high quality genetic material have usually built biosecurity (in the form of financial and personnel resources, and technology) into their operations to safeguard their high quality bloodlines.

Experience with compartmentalisation in sheep

The recent establishment in Uruguay of a compartment in sheep is an interesting development. The legal authority for the compartment is Resolution DGSG 82/014. The compartment results from a Public–Private Partnership between the Ministry of Livestock, Agriculture & Fisheries and the Uruguay Wool Secretariat ('SUL') [3]. Uruguay is recognised by the OIE as officially free from FMD with vaccination in the entire territory [4] (since 2003). Only bovine animals are vaccinated; sheep have not been vaccinated since 1988. Based on its favourable animal health status, Uruguay has many export markets for beef and sheep meat but the EU and USA restrict importation to deboned meat due to Uruguay's status as 'FMD free with vaccination'. Based on *Terrestrial Code* Article 8.7.6 FMD free compartment and the OIE checklist on compartmentalisation [6], in May 2014, Uruguay's Veterinary Services approved a compartment, composed of a 315-hectare farm belonging to SUL, for the production of bone-in lamb for export. More details on the experience of Uruguay with compartmentalisation in sheep may be found in Appendix 1.

Experience with compartmentalisation in aquatic animals

Compartmentalisation can be applied to aquaculture establishments but there are few examples of its use to date. In 2013, the Delegate for Indonesia informed the OIE of the establishment of a compartment free of nine diseases of penaeid shrimp, including diseases of crustaceans that are listed by the OIE and others of importance in the region. This compartment comprises a company with two aquaculture sites producing brood stock and shrimp for growing. The self-declaration was published in the OIE *Bulletin* in June 2013 [18]. The Delegate informed the OIE that Vietnam and Malaysia had accepted the compartment for the purpose of trade in shrimp brood stock.

Chile and Canada are developing compartments for farmed salmon and trout. The Canadian compartment will be for Atlantic salmon brood stock that is free from infectious salmon anaemia (HPR and HPRO). In Chile, it is planned to approve compartments for salmon and trout early in 2015. To this end, the Competent Authority for aquatic animal health (SERNAPESCA) is developing a Resolution on the application of compartmentalisation. This will specify the technical requirements, which will be based on the OIE standards and recommendations.

Other applications of compartmentalisation

Compartmentalisation has the potential for uses other than those discussed in this paper. The following examples illustrate two additional possibilities.

1) Artificial breeding centres

The animals in an artificial breeding centre comprise a sub-population high health status. They are regularly tested for a range of diseases and are held in biosecure facilities under veterinary supervision. Compartmentalisation could be used to facilitate the export of genetic material from a disease free population in an artificial breeding centre in countries that are not free and do not have zones free of OIE listed diseases.

2) High Health Status horse subpopulation

In May 2014 the OIE adopted Chapter 4.16, which provides recommendations for the establishment of a subpopulation of horses that have a high health status certified by the Veterinary Authority and that are moved internationally to compete in equestrian competitions [26]. In line with the provisions in Chapter 4.4., documented health management practices and biosecurity measures are used to create and maintain a functional separation between the High Health Status horse and other equids at all times. Strict biosecurity is maintained at all premises where these horses are held, including the home stable, at international competitions and during transport. Based on the definition of the subpopulation, Veterinary Authorities should facilitate the safe temporary movement and return to the country of usual residence of these horses.

Factors relevant to official recognition for the purposes of international trade

The establishment of a compartment is a preventive measure, serving both to guarantee the health status of an animal subpopulation and to avoid the disruption of export markets in the event of a disease outbreak. For the latter objective, exporting and importing countries must reach agreement on the defined compartment, preferably via an official decision of the authority in the importing country. To facilitate this, the compartment should preferably be established before a disease outbreak in the country/zone.

Independent of considerations relating to compartmentalisation, the OIE has adopted procedures for official recognition of the health status of countries and zones for six diseases: foot and mouth disease (FMD), bovine spongiform encephalopathy (BSE), African horse sickness, contagious bovine pleuropneumonia (CBPP), peste des petits ruminants (PPR) and classical swine fever (CSF) [27]. The official recognition of disease status of Member Countries is of great significance for international trade. The use of compartmentalisation is contemplated in the *Terrestrial Code* chapters on FMD, BSE, CBPP and CSF. However, the OIE does not provide official recognition of compartments for these or other diseases.

The procedures for Member Countries to make a self-declaration regarding the freedom of a country, zone or compartment from an OIE-listed disease are available on the OIE Internet website [19]. Upon request of the OIE Delegate, the URL link to a document or a website for the self-declaration of a Member Country's compartment (including contact details) may be published in the OIE Bulletin or on the OIE website. No compartments are currently listed on the OIE website. One compartment has been published in the OIE *Bulletin* [18].

A compartment may be recognised for the purpose of international trade through a bilateral agreement between trading partners. The relevant procedures are set out in *Terrestrial Code* and *Aquatic Code* Article 5.3.7: 'Sequence of steps to be taken in establishing a zone/compartment and having it recognised for international trade purposes'. This article encourages Veterinary Authorities / Aquatic Animal Health Authorities of the importing and exporting countries to enter into a formal agreement recognizing the compartment. The responsible Authority of the exporting country should promptly

inform importing countries of any occurrence of a disease in respect of which the compartment is defined [28, 29].

The importance of transparency is highlighted in the *Codes* (e.g. *Terrestrial Code* Article 4.4.8: 'The Veterinary Authority should ensure that all information is readily accessible to importing countries').

If it is not possible to agree on the recognition of a compartment, the OIE informal procedure for dispute mediation (Article 5.3.8 in both *Codes*) provides an avenue to resolve the differences between Member Countries.

At its meeting in March 2006 [15], the TAHSC considered a submission from the EU, as well as discussions in the WTO SPS Committee about timeliness in relation to decisions on equivalence, recognition of zones and compartments, and other matters relevant to international trade. It was agreed that the *Code* should provide general guidance to Member Countries without prescribing time limits for decision-making. The time taken by importing countries to recognise compartments (and zones) depends in part on the epidemiology of the disease and also on the importing country´s administrative procedures. The TAHSC considered that recommendations on administrative arrangements were out of the scope of the *Terrestrial Code* [15].

The compartmentalisation procedure can only be achieved through an effective Public–Private Partnership. As stated on the OIE Internet website: 'The Member Country must demonstrate that the compartmentalisation (...) was developed in close partnership between the Veterinary Authority and the relevant private sector involved'. The private sector plays a key role in maintaining the health status of the animals in a compartment and the private sector must normally make a significant financial investment to establish a compartment. The size of the investment depends on the management arrangements and biosecurity measures that were in existence prior to the establishment of the compartment. However, even companies with good existing biosecurity will face increased costs – for example, arising from the need to conduct active surveillance for disease agents that are exotic to the country or zone. The requirement to conduct diagnostic testing in official laboratories increases the cost of surveillance. Practical and cost considerations mean that it is not feasible for companies or sectors that have little commitment to quality in terms of animal health and biosecurity to use compartmentalisation.

Although the private sector is responsible for the management and implementation of the biosecurity plan, the responsibility for certifying the health of animals and animal products from a compartment rests with the Veterinary Authority or Competent Authority responsible for aquatic animal health. Accordingly, the credibility of these Authorities is a key factor for importing countries when considering the recognition of a compartment for the purposes of international trade. The credibility of Veterinary Services / Aquatic Animal Health Services depends on their capacity to implement the OIE standards, notably in Chapter 1.1 on disease notification and Section 3 on Quality of Veterinary Services / Aquatic Animal Health Services (in both *Codes*).

The OIE encourages Veterinary Services and Aquatic Animal Health Services to request a formal independent evaluation of quality using the OIE PVS Tool [20] or the Tool for the Evaluation of Aquatic Animal Health Services [21] as a means to demonstrate their technical capacity, independence, transparency and other critical factors that contribute to credibility in the eyes of trading partners.

One of the 47 critical competencies in the OIE PVS Tool (2013 Edition), Critical Competency IV-8, deals with the authority and capability of the Veterinary Services / Aquatic Animal Health Services to establish and maintain disease free compartments as necessary to apply compartmentalisation. The criteria for evaluating the possible levels of advancement for this critical competency are shown in Table 3.

Reports of the PVS Evaluations of eight countries in the Region of the Americas may be viewed on the OIE website [13]. There is a wide variation in the capacities of Member Countries in the region to use compartmentalisation, from level 1–2 (Bolivia, Belize, Haiti) through level 3 (Panama) to level 5 (Chile, based on observation of the PABCO system of registering and accrediting farms for the export of products to the EU). In the PVS reports of Brazil (2007), Paraguay (2009) and Uruguay (2007) the use of compartmentalisation was stated as 'not applicable'. This changed with the PVS follow-up evaluations of Brazil and Uruguay in 2014 [13].

The indicators of a high level capability reflect the arrangements for collaboration with the private sector and the capacity to obtain recognition of trading partners for the compartments established. However, as shown in this paper, few countries have been successful in obtaining such recognition.

Table 3
Levels of advancement for Critical Competency IV-8 – Compartmentalisation

Level 1	The VS cannot establish disease-free *compartments*.
Level 2	As necessary, the VS can identify animal sub-populations with a distinct health status suitable for compartmentalisation.
Level 3	The VS ensure that biosecurity measures to be implemented enable it to establish and maintain disease free *compartments* for selected animals and animal products, as necessary.
Level 4	The VS collaborate with producers and other interested parties to define responsibilities and execute actions that enable it to establish and maintain disease free *compartments* for selected animals and animal products, as necessary.
Level 5	The VS can demonstrate the scientific basis for any disease free *compartments* and can gain recognition by other countries that they meet the criteria established by the OIE (and by the WTO SPS Agreement where applicable).

How could the use of compartmentalisation be promoted?

To answer this question it is necessary to identify the factors that influence a decision to establish a compartment, noting that this is primarily a decision of the private sector (with support of the Veterinary Authority). The use of compartmentalisation is voluntary and, as discussed in this paper, there are few animal health compartments operating at this time. Zoning, which is a related procedure, is used much more frequently. The OIE grants official recognition of zones for FMD, BSE and (from 2015) for CSF. For FMD alone, there are OIE recognised disease free zones (with or without vaccination) in 13 countries [14]. Why is zoning more popular? Obtaining OIE recognition of a zone that is free from FMD can help a country to establish export markets, even if all importing countries do not automatically accept the OIE decisions. The fact that there is no pathway for OIE recognition of a compartment for any disease may discourage countries from using compartmentalisation.

Another possible factor supporting the use of zoning arises from the fact that governmental authorities normally implement the measures that maintain zones and the private sector is mainly responsible to comply with official controls. With zoning, unlike compartmentalisation, the public sector establishes the control measures and bears the associated costs. Perhaps this makes zoning more popular. On the other hand, it should be noted that in some Latin American countries the private sector provides most of the resources for official disease control programmes carried out by the Veterinary Services, notably with respect to FMD.

As previously stated, it is preferable to establish a compartment 'in peace time', that is, when the country is free from the diseases of interest. This approach was followed in Chile, with the establishment of a pork production compartment for four exotic diseases (FMD, CSF, ASF and Aujeszky's disease) as a type of 'insurance' against the risk of a disease incursion. This farm was a very large enterprise, which could have doubled the national pork production of Chile. It closed in 2013 for reasons unrelated to animal health and no other operator has proposed to establish a similar compartment. In countries that have a favourable animal health status, such as Chile, the private sector may see disease control as a responsibility of government. If the government is doing a good job, what is the rationale for the private sector to invest in costly management and disease surveillance procedures? Especially if there is no guarantee that importing countries will recognise the compartment for the purposes of trade.

Perhaps the most important factor in favour of compartmentalisation relates to disease epidemiology. No country can exclude the entry of wild birds carrying avian influenza viruses. Similarly, it may be impossible to eradicate diseases such as CSF, ASF and aquatic animal diseases from wild animal populations. For diseases that have wildlife reservoirs, compartmentalisation gives the private sector the opportunity to protect its investment by establishing effective separation between farmed and wild species.

The use of compartmentalisation should be supported by Member Countries not only as a trade facilitating measure but also as a tool to improve animal health through better biosecurity and to reduce the likelihood and impact of disease outbreaks. For this purpose, Veterinary Services are encouraged to form effective Public–Private Partnerships with the livestock sectors and with the private

veterinary sector and to share information relevant to animal health and disease prevention, including the results of applied research.

The OIE encourages the Veterinary Authority and the Competent Authority for aquatic animal health to involve the private sector in the development and any major revision of animal health programmes. The private sector should be seen as a partner and the incorporation of industry programmes and initiatives to complement and strengthen government programmes should always be considered.

Governments should review the veterinary legislation to ensure that there is no legal impediment to the use of compartmentalisation domestically or to the recognition of compartments established by trading partners. The EU model provides a harmonised approach to the use of compartmentalisation for avian influenza and could be considered by other regional groupings, such as MERCOSUR[1], as a means to facilitate the recognition of compartments at the regional level.

To provide scope for appropriate involvement of the private sector in the implementation of compartmentalisation, including the 'HHP' concept for horses, the Veterinary Authority and the Competent Authority for aquatic animal health should take steps to ensure that they have legal authority to accredit private veterinarians (*Terrestrial Code* Article 3.4.5), aquatic health professionals (*Aquatic Code* Article 3.1.2 point 9) and diagnostic laboratories according to OIE recommendations.

Veterinary Services and the Aquatic Animal Health Services should continually strive to strengthen their transparency, independence and integrity, including through participation in the OIE PVS Pathway, as a basis to support the negotiation of export markets using zoning, compartmentalisation or other approaches endorsed by the OIE.

The OIE should continue to share information on Member Countries' implementation of compartments via publication in the *Bulletin* and the inclusion of relevant information on the OIE internet website.

The OIE should continue making provision for the use of compartmentalisation in the individual disease chapters in the *Terrestrial Code* (as appropriate).

The OIE should consider the development of procedures for the official recognition of compartments for those diseases that are already the subject of official recognition.

The OIE should continue working to convince governments and donors that strengthening Veterinary Services and Aquatic Animal Health Services is a priority to improve human and animal health and animal welfare as well as productivity and help to reduce poverty.

It is especially important to promote the use of compartmentalisation in aquatic animals. The forthcoming OIE World Conference on Aquatic Animal Health 'Riding the Wave to the Future', to be held in January 2015 in Vietnam, will feature a session on zoning and compartmentalisation and the conference recommendations will surely address means to promote these concepts.

Conclusions

Establishing and maintaining a disease free status in the entire national territory should be the final goal of OIE Member Countries. However, if this cannot be achieved in the short to medium term, a country may benefit from the establishment of a disease-free compartment for the purpose of disease control. All countries may use compartmentalisation as a preventative measure to preserve export markets in the case of a disease outbreak.

Compartmentalisation entails the definition of an animal sub-population of a specified health status within the national territory. This status is maintained through management and husbandry practices related to biosecurity, in compliance with the standards in the *Terrestrial Code* (Chapters 4.3 and 4.4.) or the *Aquatic Code* (Chapters 4.1. and 4.2.) and the recommendations in the relevant disease chapters.

The national Veterinary Authority or Competent Authority for aquatic animal health is responsible for granting, suspending and revoking the status of a compartment. When a compartment is established to facilitate international trade, it is preferable that trading partners reach agreement while the exporting

1 MERCOSUR (Mercado Común del Sur) is a subregional group that includes Argentina, Brazil, Paraguay, Uruguay and Venezuela. Bolivia, Chile, Colombia, Ecuador and Peru are associated; Mexico and New Zealand are observers

country or zone is free of the diseases of interest. The exporting country must be able to show that the compartmentalisation is supported by an effective biosecurity plan developed in close partnership with the relevant private sector.

Disease epidemiology is an important factor in a decision to establish a compartment. No country can exclude the entry of wild birds carrying avian influenza viruses. The eradication of diseases from wild animal populations, both terrestrial and aquatic, may be impossible. For diseases that have a wildlife reservoir, biosecurity is an essential tool and the use of compartmentalisation may be the best option for establishing a disease free domestic population.

The use of compartmentalisation should be supported by Member Countries not only as a trade facilitating measure but also as a tool to improve animal health and to reduce the risk of disease outbreaks. Strengthening Veterinary Services and Aquatic Animal Health Services and building effective Public–Private Partnerships with the livestock sectors and with the private veterinary sector, consistent with the OIE PVS Pathway concepts, are the keys to success.

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Appendix 1

COMPARTMENTALISATION – URUGUAY'S EXPERIENCE

The recent establishment of a sheep compartment in Uruguay is an interesting development. The legal basis for the compartment is Resolution 82/2014. The compartment is the result of a public–private partnership between Uruguay's Ministry of Livestock, Agriculture and Fisheries (MGAP) and the Uruguayan Wool Secretariat (SUL) [3]. SUL is a private public-interest organisation dedicated to sheep improvement and promotion and is directed and financed by Uruguayan sheep producers. Uruguay has been officially recognised by the OIE as a country free from foot and mouth disease (FMD) practising vaccination [4] (since 2003). Only cattle are vaccinated because sheep have not been vaccinated since 1988. Although Uruguay has many export markets for beef and sheep meat owing to its favourable animal health status, the European Union and United States restrict imports of deboned meat owing to Uruguay's status as 'FMD-free with vaccination'.

For this reason, and on the basis of Article 8.7.6 in the OIE *Terrestrial Animal Health Code* (*Terrestrial Code*) on FMD-free compartments and the OIE checklist on compartmentalisation [6], in May 2014 Uruguay's Veterinary Services approved a fattening compartment for the production of lamb meat for export.

Nowhere else in the world has there ever been a compartment like the one Uruguay is developing, with the characteristics of being rangeland intended to guarantee country FMD freedom by separating one species (sheep) that is not vaccinated against FMD from another species that is vaccinated (cattle).

Technical framework

In all cases, final authority for defining, maintaining and certifying a compartment lies with the country's Veterinary Authority. This was done in accordance with the guidelines in Chapters 4.3 and 4.4 of the *Terrestrial Code*.

In Chapter 4.4, the OIE establishes the basic premises that the management of a compartment should provide to the Veterinary Authority (with documented evidences), including:

1) Definition of the compartment
2) Epidemiological separation
3) Documentation of the critical factors ensuring the feasibility of maintaining a compartment
4) Supervision and control of the aspects that give confidence in the compartment
5) Surveillance actions to be applied according to the disease for which they were defined
6) Diagnostic capability for disease detection
7) Response to animal health emergencies.

Of note is the fact that, prior to this, variables in the *Terrestrial Code* chapters had been adapted to Uruguay's free-range livestock production system.

These issues were discussed and a visit to the pilot site was coordinated with SUL, where the conditions were observed and the first recommendations were made.

Stages in the process

The process of implementing the compartment included the following stages.

Stage 1: Comprised the establishment of the animal health requirements for a compartment in accordance with OIE standards. In this case, the requirements were adapted to a free-range farming system, where the exclusion factor was not the same as in most of the compartments developed hitherto – the absence of a disease present elsewhere in the country – but rather the absence of vaccinal antibodies in a given species for a disease not present in the country.

Stage 2: After meeting the requirements, this stage comprised a documentary assessment and on-site verification of the compartment's characteristics. In the absence of similar experiences elsewhere in the world to be used as a reference, OIE collaboration was requested in the person of Dr Alejandro Thiermann, President of the OIE Terrestrial Animal Health Standards Commission, who is considered to have the greatest experience and technical authority on the subject. The on-site verification by Dr Thiermann in May 2014 was satisfactory, according to the report issued subsequently by OIE Director General, Dr Bernard Vallat, who stated that the compartment was structured in accordance with the guidelines in the *Terrestrial Code*.

Stage 3: Comprised approval of the compartment by means of Resolution 82/014 of 20 May 2014 by MGAP's General Department of Livestock Services (DGSG) authorising SUL to establish an FMD-free sheep compartment without vaccination. The resolution designates the DGSG as the competent animal health authority for the compartment, approves the procedure attached as an appendix and makes it an integral part of the Resolution (82/2014).

Stage 4: Comprised the certification subsequent to issuance of the certificates by the Veterinary Authority, through the DGSG's Animal Industry Division. The product labels contain the information that cuts of meat on the bone come from sheep in the compartment, which is ensured by means of traceability throughout all stages in the process.

Stage 5: This stage is currently in full swing, in view of the fact that the compartment's authorisation to operate commercially relies on bilateral recognition with target markets.

Characteristics of the FMD-free sheep compartment without vaccination

Definition of the compartment

The site of the compartment belongs to the Uruguayan Wool Secretariat (SUL) and covers 315 hectares in the Department of Florida in south-central Uruguay.

The subpopulation of this compartment consists of lambs to be fattened over a three- to five-month period prior to slaughter.

The mothers and their lambs come from establishments registered and certified as healthy by the official Veterinary Authority.

The sheep that entered the compartment are weaned lambs, in excellent health, that come from mothers which (like the rest of the country's sheep population) are unvaccinated.

They were identified individually by means of both a visual ear tag and an electronic ear tag (the same system used for cattle) and their blood was tested for the absence of antibodies to the FMD virus. After testing negative for the presence of antibodies (results processed by the official laboratory), the lambs' electronic identifiers were read before they were dispatched to the compartment.

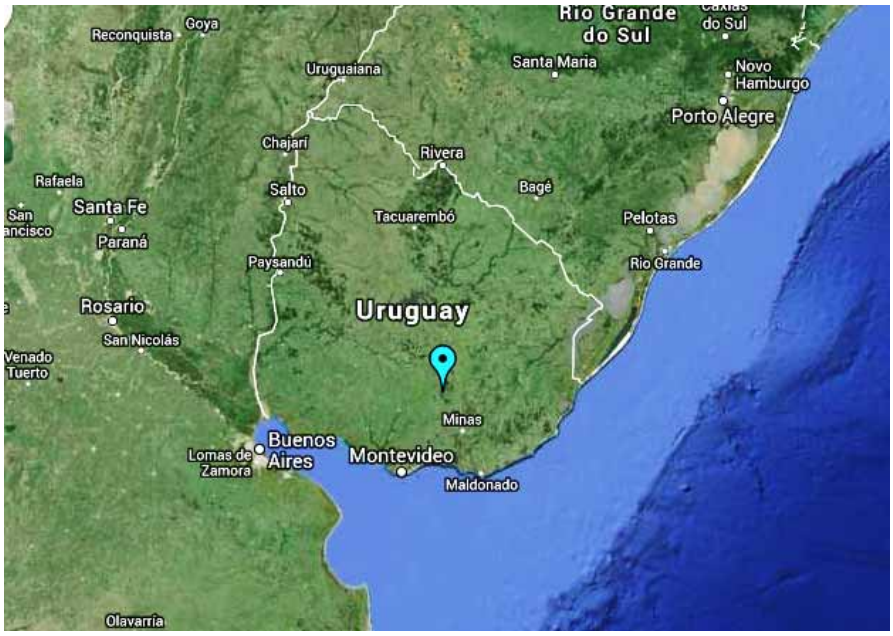

Fig. 1
Geographic location of the compartment in Uruguay

Epidemiological separation

Spatial and physical factors

The site is bordered by planted forest, roads, railways and legal fencing to ensure separation from other animal populations.

The compartment's legal perimeter consists of a double wire fence to prevent any type of contact with or entry of other animals – the outer one a 1m35 high seven-wire fence with posts spaced 1m87 apart and gaps between the wires of 0.16 - 0.14 - 0.14 - 0.16 - 0.20 - 0.25 - 0.30 and, at a distance of 1m50, an inner 3-4-wire electric fence (1m10 high).

Infrastructure

The establishment has its own facilities for working with sheep and limited points of access for easy control of entry, providing the required conditions for biosecurity. There are specific facilities for: loading and unloading; isolation of animals; introduction of material and equipment; and storage of feed and products.

Traceability

As mentioned above, in the lambs' establishment of origin, at weaning and prior to entering the compartment, they were identified individually with an electronic ear tag and were registered. Concomitantly, blood samples were taken from each lamb identified for the compartment for the purpose of serological testing for the absence of FMD virus antibodies.

The diagnostic tests to support the compartment's animal health status as free from antibodies are 3 ABC enzyme-linked immunosorbent assay (ELISA) and liquid phase blocking ELISA, performed by Uruguay's official veterinary laboratory: 'Dr Miguel C. Rubino' Laboratory, Veterinary Laboratories Division (DILAVE).

When animals enter the compartment and when they leave it for slaughter, their identification is checked by reading.

The traceability of the lambs from their place of birth to slaughter is therefore certified by reading the electronic ear tags.

When they reach live slaughter weight, the animals are transported in sealed vehicles to the meat-processing plant approved for the purpose, where slaughter is reserved exclusively for them. The slaughter plant's official veterinary inspector (IVO) checks the documentation accompanying the animals, as well as their identification, in line with the procedures established and approved by the DGSG.

Following slaughter, the label certifies that the meat cuts or carcass come from the sheep compartment.

Surveillance actions and diagnostic capability

Surveillance is performed for listed diseases and the specific recommendations for FMD in the OIE *Terrestrial Animal Health Code* are followed in order to detect the infection (and, where appropriate, the disease) in the animal population rapidly.

Obviously diagnostic capability is based on the responsiveness of diagnostic laboratories. The recognition of compartments requires laboratory tests the results of which support the health status of such units. These tests should preferably be performed in an official laboratory or in accredited laboratories. The DILAVE official laboratory has the capability to diagnose FMD using the indirect sandwich ELISA test for virus typing and the polymerase chain reaction (PCR) test. The official tests must comply with the standards in the *OIE Manual of Diagnostic Tests and Vaccines for Terrestrial Animals*, which includes virtually all diseases currently affecting international trade. In addition, a quality assurance system is applied to laboratories, based on international standards, and trained personnel are extremely important.

There is a national contingency plan in the event of an FMD outbreak.

Operation, documentation and registration

Records are kept of animal production, surveillance results, and morbidity and mortality. Staff training is documented.

There are manuals of procedures for the various stages in the process. All these activities are supervised and audited by the official animal health authority, represented by the DGSG.