

A collaborating centre on animal health economics for the Americas

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Summary

Countries in the Americas play a vital role in global livestock and aquaculture production. With international trade of livestock and aquaculture products becoming an important source of income for countries, there has been an increased interest in using animal health economics for advocacy and allocation of resources. This paper focuses on discussing: 1) the development of a new Collaborating Centre for the Economics of Animal Health and 2) the applications of the Global Burden of Animal Diseases (GBADs) framework in the Americas region. Incentives for the increased use of economics in animal health decision making and examples in the Americas region are examined. We then discuss the newly formed World Organisation for Animal Health Collaborating Centre in the Americas region. Finally, we review two on going case studies that are implementing the GBADs framework in Peru and the United States of America.

Keywords

Animal health economics – Collaborating centre – GBADs – Global Burden of Animal Diseases.

Introduction

The Americas – conformed 35 sovereign nations and 23 territories dependent on a foreign nation – is a relevant producer of animal protein. In 2021, the Americas produced about 107.0 million tons of meat from chicken (50.2 mil tons), beef (32.9 mil tons), and pork (23.9 mil tons) (Table 1) [1]. This accounts for approximately 45%, 41%, and 20% of total world beef, chicken, and pork production, respectively. Like elsewhere, fishery and aquaculture are also important sources of protein and are a growing sector too; they provided about 7.0 million tons in 2021 [1]. Animal production is crucial for the economies of the Americas, rural livelihoods and sustainable development, and is key to global food security.

International trade of animal protein is an important source of income for the Americas. In 2021, 18.0 million tons of meat, valued at USD\$55,695 million, was exported from the Americas, representing 55% (chicken), 51% (beef), and 35% (pork) of total world meat exports [1] (Figure 1). As seen in Figure 2, exports of aquaculture from the Americas comprise 17% of world total (6.0 mil tons). Animal health is a safeguard for efficient production, food safety, animal welfare, public health, and environmental sustainability. It is also of paramount importance for securing access to export markets.

Nearly every country has its own animal health authority linked to its Ministry of Agriculture or similar administrative body; the head of the National Veterinary Services (NVS) is usually the World Organisation for Animal Health (WOAH) delegate. NVS competences include animal health and welfare, as well as food safety and international trade certifications related with animal products. Many countries in the Americas have sub-national animal health authorities that ensure coverage of animal health programmes and tailor disease surveillance measures in large countries, with vast and complex livestock industries. Historically, public-private partnerships have been important to deal with control, eradication, and prevention of animal diseases of national interest.

Incentives and impact assessment

Animal health burdens are associated with economic losses. Direct losses to the livestock sector are predominately due to mortality and morbidity, but there are also indirect losses and wider economic impacts. In exporting countries, animal health is perceived as a critical component of the livestock industry because animal diseases are often a trade barrier. In this case, transboundary diseases (e.g. foot and mouth disease [FMD]), tend to get investment priority, both from the animal health authorities and the actors of exporting value chains, given the potential economic impacts across society of an outbreak and the resulting disruption of trade flows.

Potential public health and environmental losses are placed as barriers to trade, but rarely measured or estimated, although this may change with the increasing emphasis in One Health. Most animal health programmes are not based on any economic analysis, both for establishing investment priorities and for planning of on-going programmes. This is partly due to the perception that any effort to prevent or control a given disease will reduce its economic impact, whatever it may be. It should be stressed that in exporting countries, the focus on trade/transboundary diseases might add to the perception that investments need not be underpinned by an economic analysis, given the sheer size of societal economic impact in the event of an impediment to trade. In fact, economic analysis is often used for advocacy purposes, to justify the maintenance of investments.

Animal health economic studies were particularly scarce between the 1950s and 1990s [2,3]. In contrast, the number of studies has grown since then perhaps due to the restructuring of Veterinary Services, lack of financial resources, private-public partnerships, and international policies, all of which changed in the 1990s [4].

Most studies have focused on transboundary diseases with trade implications, such as FMD, using cost–benefit analysis and/or economic impact assessments. The interest of Veterinary Services in the economics of animal health has increased significantly, with their main goal being to justify their budgets. The Food and Agriculture Organization of the United Nations (FAO), Inter-American Development Bank and WOAHA support consultancies and studies, while capacity-building has been promoted by FAO and Inter-American Institute for Cooperation on Agriculture (IICA). Some Veterinary Services have estimated losses and justified national programmes, and several academic studies have also been carried out as detailed in Rojas and Romero [4].

Veterinary epidemiology training in Latin American and Caribbean region (LAC) was boosted in 2003 by the 10th International Symposium on Veterinary Epidemiology and Economics (ISVEE) in Chile. Between 2012 and 2015, networking and training activities were held that engaged developed countries with LAC (e.g. post-ISVEE workshop in 2015 [4]). Capacity-building to generate effective tools for the economics of animal health has been endorsed by WOAHA since its 84th General Session in May 2016.

Some universities have linked economics with their epidemiology curricula at veterinary faculty in LAC, as an example National University of San Marcos (Peru), the University of Chile, the University of La Salle (Colombia), the Universities of Brasilia and the University of São Paulo (Brazil).

Nowadays, there is a growing interest in animal health economics within Veterinary Services with advocacy as a primary goal, but also decision making for efficient allocation of resources.

Previous efforts to build capacity on animal health economics

In 2015, IICA started delivering training in Animal Health Economics with workshops in Argentina, Bolivia, Brazil, Chile, Colombia, Costa Rica, Ecuador, Paraguay, Peru, Uruguay and Venezuela [5]. The Permanent Veterinary Committee of the Southern Cone (CVP) has also a strong interest in this area as they offered training on brucellosis control and eradication national programmes, with four of the six countries completing a cost-benefit analysis (CBA) of their programmes [6]. Barros *et al.* [7] conducted a retrospective study of the bovine brucellosis programme in the Brazilian state of Mato Grosso. After realising the added value of these trainings, the CVP offered a second CBA workshop in 2022. An outcome of interest was the expressed desire to have an *ad hoc* Animal Health Economics group and the creation of a network of Veterinary

Services. Moreover, it was stated the interest of being involved in the Global Burden of Animal Diseases (GBADs) programme as a region.

Development of a WOAHA Collaborating Centre

WOAHA Collaborating Centres are designed to provide scientific expertise and support to WOAHA and its members in a specific specialty. In regard to the specialty area, the Centres also carry out and/or coordinate scientific research, collect/analyse/report data, provide scientific/technical trainings and meetings, identify and maintain expertise, network with other WOAHA Collaborating Centres, and provide consultancy to WOAHA when requested.

WOAHA's Collaborating Centre for the Economics of Animal Health – Americas Region (CCEAH-A) was formed with five key partnering universities: Kansas State University, University of Brasilia, University of São Paulo, National Autonomous University of Mexico and Washington State University. These universities were selected as the key partners based on several criteria, including expertise of both the director and staff at each institution, common vision of the Centre among the universities directors', and importance of the livestock and aquaculture industries in the country. The CCEAH-A will work with terrestrial livestock and aquatic animals with a focus on building capacities for the systematic use of economics of animal health methods with outcomes that are aligned with the GBADs programme. The specific goals of the Centre include:

- Improving methods to estimate animal disease and health burdens, where they occur, to whom and by causes and risk factors;
- Improving access to and standardisation of animal disease and health burden information through the development of a shared, cloud-based knowledge engine;
- Improving capacity to interpret and use animal disease and health burden information.

Addressing these objectives will be achieved not only by a multi-disciplinary team of economists, epidemiologists, veterinarians, computer and data scientists, and educators, but cross academia, industry, and government.

The application process for CCEAH-A started with discussions with personnel from WOAHA, office of the U.S. delegate to WOAHA, and the director of CCEAH-A approximately 10 months prior to formal submission of the application. These discussions allowed for a better understanding of the requirements, timeline, etc. of the

application process. Next, the director at Kansas State University identified individuals at the other key partner institutions. Throughout this identification and networking process, we were able to establish additional collaborating partnerships (e.g. International Congress and Convention Association). After the key partners agreed to the vision and goals of the proposed centre, the next step was to draft the formal application following WOA's Collaborating Centre guidelines. In mid-December 2022, the formal application, along with letters of support from each of the key partners WOA member delegate (i.e. letters of support from the Chief Veterinary Officer (CVO) from Brazil, Mexico, and the United States of America, were submitted to U.S. CVO (the lead institution's WOA member delegate), who submitted the application to WOA. Over the next five months, several committees reviewed and evaluated the application, including both Specialist Commissions – Biological Standards Commission and the Aquatic Animal Health Standards Commission, WOA's Council, and WOA's Regional Commission for the Americas. After being endorsed by WOA's Council and the Regional Commission for the Americas, in May 2023 during the 90th WOA General Session, the World Assembly of Delegates of WOA confirmed the designation of the new CCEAH-A. For additional information on the formal application process for a WOA Collaborating Centre, visit the WOA's website at: <https://www.woah.org/en/what-we-offer/expertise-network/collaborating-centres/#ui-id-2>.

It is understood that coordination between WOA (both global and regional levels), the new CCEAH-A, the GBADs team, and IICA is critical to the uptake of GBADs in the Americas. As such, several initial case studies are in the beginning stages and will start to open the door for future work in the region with our stakeholders. Two examples include evaluating the health burden of: Pacific white shrimp (PWS) in Peru and the U.S. broiler industry.

Case studies in the Americas

As transboundary animal diseases are progressively eradicated, there will be a shift to controlling and preventing endemic diseases. These diseases typically require sustained private-public investments over time and bring about the need for better prioritisation and optimisation of resource allocation. This is where animal health economics concepts become of paramount importance, and in turn, will drive interest in the GBADs programme.

Several case studies that will evaluate animal health burdens in the Americas region are in the initial stages. We briefly describe two case studies.

Pacific white shrimp in Peru

Fisheries and aquaculture are a growing sector in Peru, and oriented to both domestic and export markets. Peruvian governments have seen potential in aquaculture (more than 40% growth between 2010–2020) and among it, the production of PWS has been prioritised. In 2019, production of PWS was over 50,000 tons, strongly oriented to exports, about USD\$230 million, and over 70% of total exports are destined to the United States of America and Italy [8].

Regarding health problems in PWS systems, the Ministry of Production and the National Fisheries and Aquaculture Health Agency (SANIPES) has followed WOA's notifiable disease list and prioritised them as follows:

- First level: white spot syndrome virus (WSSV), infectious hypodermal and haematopoietic necrosis virus (IHHNV) and necrotising hepatopancreatitis (NHP).
- Second level: infectious myonecrosis virus (IMNV), yellow head virus genotype 1 (YHV1) and Taura syndrome virus (TSV).

PWS health information comes mainly from SANIPES surveillance system, including prevalence of prioritised diseases. However, there are no data concerning disease direct impact or detailed cost expenditures. Although SANIPES health programme budget is available, it is difficult to identify specific allocation to PWS diseases.

Preliminary work of PWS evaluated a potential production without a disease, assuming a prevalence of 7.2% and 80% of mortality. Assuming current export and production levels, the losses for WSSV, IHHNV, and NHP were estimated at USD\$13 million, \$57 million, and \$41 million, respectively [9]. This information has the opportunity to better help the industry and policymakers design and implement data collection from the field using the SANIPES structure and increase collaborations between the Ministry and PWS farms.

Broilers in the United States of America

The U.S. poultry industry is an important sector both to U.S. and global economies. U.S. poultry sales were USD\$76.9 billion in 2022, a 61% increase from the previous year, with broiler production seeing an increase of 22% since 2013 [10]. This increase in production is a result of domestic and foreign consumption. U.S. poultry consumption increased more than 16%, while 17% of U.S. broiler production was exported [10].

A case study evaluating the animal health burden for the U.S. broiler industry is currently underway. Following the GBADs programme [11], the animal health loss envelope (i.e. the envelope contains the losses and expenditures resulting to individual animal health burdens) is calculated for the U.S. boiler industry. Both the current realised broiler production and ideal broiler production (i.e. no animal health burdens) are estimated. The animal health loss envelope is then broken into morbidity and mortality and condemnations. In other words, U.S. broiler production losses due to morbidity and mortality and condemnations are estimated. Based on 2020 data, the burden of disease for U.S. broiler production was estimated at 2.30 million tons of lost production; 1.67 million tons due to mortality and condemnations and 0.64 tons due to morbidity [10]. These production losses were then evaluated using 2020 prices (e.g. housing, feed, labour, etc.) to estimate an economic burden of disease of \$0.19 increased cost per kg of live weight [12]. Currently, a partial equilibrium model is being developed to evaluate changes in producer and consumer welfare to various participants along the supply chain, including international markets. Preliminary findings suggest feed costs are substantially higher due to animal health burdens. The findings from this case study will be shared with policymakers and industry participants and allow them to make better informed decisions regarding animal health investments and resource allocation.

Conclusions

Interest in the burden of animal health, including the economics of animal health, has been growing over the past two decades. A recent framework, GBADs programme, has been developed as a systematic way to measure losses associated with animal health issues. This paper focuses on the development of a WOA's CCEAH-A and applications of the GBADs programme in the Americas region.

The CCEAH-A was recently established to address such issues. The CCEAH-A will develop systematic economic methods and tools, promote the use of economics in animal health planning and decision-making, provide information on the burden of animal diseases, build networks of animal health economists, and support the establishment of future collaborating centres in this specialty in other regions. Additionally, the CCEAH-A will work closely with the CCEAH-European Region to take advantage of their experiences with GBADs.

Several applications, or case studies, of GBADs in the Americas are in process and others in initial discussions. The preliminary findings suggest that animal health burdens have significant economic impacts on the PWS and broiler industries. With additional

investments or better allocation of current investments in animal health systems, there is the possibility of reducing the animal health burden to society.

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Table I**Meat production from cattle, chickens and pigs, 2021 [1]**

| Region/Country | Quantity (tonnes) |
|----------------------------------|--------------------------|
| Caribbean | |
| Antigua and Barbuda | 57.0 |
| Bahamas | 18.8 |
| Barbados | 161.0 |
| Cuba | 62,031.7 |
| Dominica | 563.6 |
| Dominican Republic | 62,317.0 |
| Grenada | 137.3 |
| Haiti | 49,027.8 |
| Jamaica | 6,545.0 |
| Puerto Rico | 5,395.6 |
| Saint Kitts and Nevis | 52.3 |
| Saint Lucia | 415.0 |
| Saint Vincent and the Grenadines | 177.5 |
| Trinidad and Tobago | 1200.0 |
| Central America | |
| Belize | 1,536.0 |
| Costa Rica | 92,794.0 |
| El Salvador | 16,712.9 |
| Guatemala | 215,336.8 |
| Honduras | 66,000.0 |
| Mexico | 2,130,591.8 |
| Nicaragua | 167,369.0 |
| Panama | 76,422.0 |
| Northern America | |
| Canada | 1,385,544.0 |
| United States of America | 12,733,643.0 |
| South America | |
| Argentina | 2,981,690.0 |
| Bolivia | 284,195.2 |
| Brazil | 9,750,000.0 |
| Chile | 209,971.6 |
| Colombia | 758,736.9 |

| | |
|-----------|-----------|
| Ecuador | 229,014.2 |
| Guyana | 2,071.0 |
| Paraguay | 522,776.0 |
| Peru | 189,922.9 |
| Suriname | 1,821.0 |
| Uruguay | 572,522.0 |
| Venezuela | 371,425.6 |

Pre-print

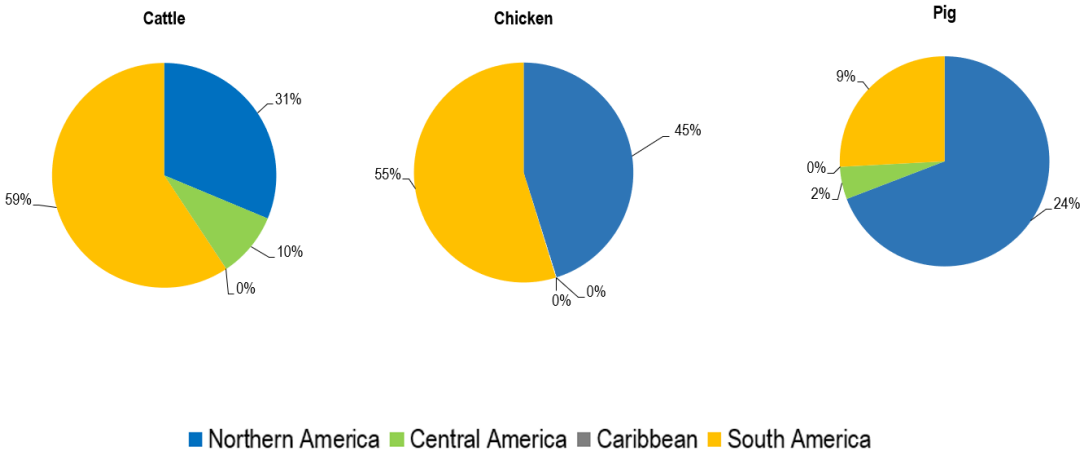


Figure 1
Meat exports across the Americas by species, percentage of world total, 2021 [1]

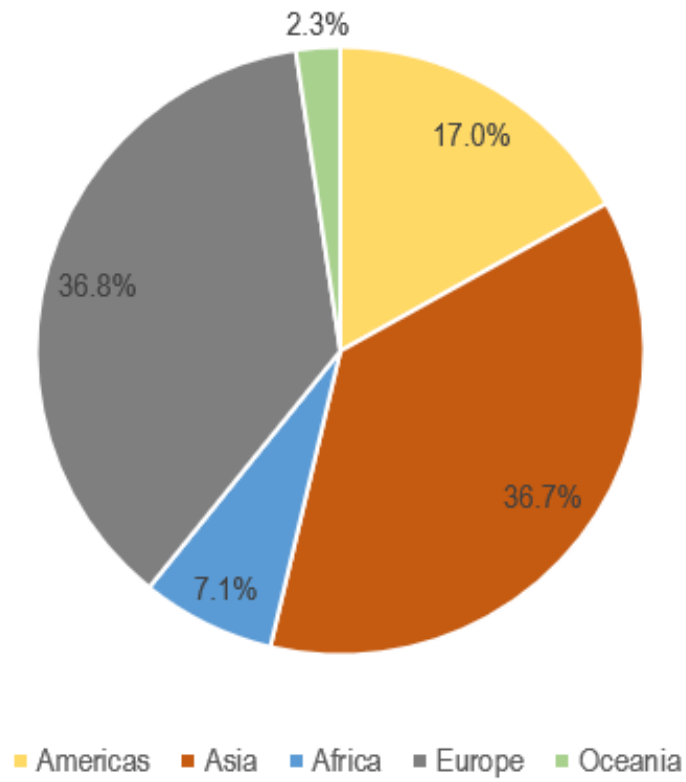


Figure 2

Global aquaculture exports by region, percentage of world total, 2021 [1]