# Partnerships for policy: initiating a Global Burden of Animal Diseases case study in Indonesia

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## Summary

The Global Burden of Animal Diseases (GBADs) programme aims to quantify the economic and broader societal costs of animal disease, providing information to policy makers and other stakeholders to inform investments into animal health. Within this context, the Indonesian case study brings together a multidisciplinary and multi-national team to pilot the GBADs methodology in the Asia-Pacific region. In this paper we describe the process of building a case study, and based on our experience, summarise key learnings to inform the development of future case studies and similar projects. Our recommendations focus on the steps required to build successful partnerships to deliver a complex programme of work; we highlight the need to consider the local context in aligning project and country priorities, the importance of early engagement with a range of stakeholders, and the need for regular and clear communication within the project team.

#### Keywords

Beef – Cattle – Dairy – Indonesia – Livestock – Pigs – Policy – Poultry – Research partnerships.

### Introduction

Poor animal health has negative impacts on farmer livelihoods, human health, and environmental outcomes, through contributions to malnutrition, risk of zoonotic disease exposure, and inefficient production. However, expenditure on animal health is poorly documented and badly understood. The Global Burden of Animal Diseases (GBADs) programme is an international consortium developing methods to quantify the economic, social, and environmental costs of animal diseases from farm to global scale, with the aim of better informing and evaluating investments into animal health.

Case studies are being used to test the GBADs methods across a range of data ecosystems (availability, resolution, quality) and production systems, build national capability in disease burden estimates, and provide localised estimates of animal health losses for different countries. The Indonesian case study is the first GBADs case study commissioned in the southern hemisphere and provides a contrast to other case studies being implemented in Europe and Africa, as well as acting as a staging post for GBADs in the Asia-Pacific region.

The aims of this case study are to 1) encourage local ownership and input into the development of the GBADs framework in Indonesia; 2) collate datasets and generate improved knowledge of livestock population, biomass, and economic value to Indonesia to facilitate policy and national investment decisions under the GBADs framework; 3) estimate the animal health loss envelope for livestock production systems in Indonesia with methodological input from GBADs workstreams; and 4) develop south-south capacity for animal health economics through collaboration with other case studies. This paper describes the process for initiating the Indonesian case study and the local animal health policy context. We highlight the importance of strong partnerships for effective research collaborations and summarise some of the lessons learned so far with relevance for future case studies with a global perspective, a multinational research team, multisectoral focus, and a complex methodology.

#### Animal disease context in Indonesia

Meat, eggs, and milk are produced across a range of production systems in all regions of Indonesia, from smallholder through to large, intensive, commercial operations. Beef and buffalo meat, chicken meat, and eggs are considered staple foods, and production of these is concentrated in Java. Poultry is the largest livestock sector, with over 10 million tons of meat and eggs produced in 2022 (Table I), and production systems are currently transitioning from open-housed to more intensive and controlled closed-house systems. Beef is mostly produced in smallholder systems, and both live cattle and chilled meat are imported from other countries to fill gaps in beef supply. Goats and sheep are important systems for smallholders, the dairy sector is gaining importance, and pigs continue to be regionally important, with the majority of households in East Nusa Tenggara owning at least one pig [2]. Livestock in Indonesia also perform important social and cultural roles – cattle racing marks the end of the rice harvest in Madura, buffalo are used in funeral ceremonies in the Tana Toraja Regency of Sulawesi, live pigs are gifted for funerals and traditional ceremonies in East Nusa Tenggara, and large numbers of animals are slaughtered annually across the archipelago for Idul Adha.

The disease burden and productivity of livestock in Indonesia are influenced by many factors including production system, animal husbandry practices, biosecurity, access to veterinary services, environment, and the occurrence of natural disasters such as earthquakes and volcano eruptions. Outbreaks of infectious diseases such as highly pathogenic avian influenza (HPAI), African swine fever, Lumpy skin disease and foot and mouth disease have caused large economic losses and public concern about food safety and zoonotic transmission across the country. For example, HPAI outbreaks in 2004-2007 are estimated to have caused USD \$315 million in losses associated with culls, lost trade, decreased demand, and treatment costs [3]. In addition, inadequate nutrition, reproductive management, and animal husbandry are also key drivers of poor productivity, especially in low-input systems [4]. Biosecurity and access to veterinary services are limited in remote areas, and sick animals may be treated with traditional medicine, if at all, resulting in high mortality rates for sick animals [5]. Improving livestock production is a key priority of the Indonesian government as a means of increasing the living standards and food sovereignty of a growing and rapidly urbanising human population. Agricultural policies focus on enhancing domestic production of key commodities, especially beef meat and poultry; increasing affordability and accessibility of food; mitigating disruptions to food security due to natural disasters, climate change, and disease; increasing food quality and safety; and increasing income of producers [6].

Indonesia has a decentralised government, with decisions relating to the prevention and management of animal disease made by both national and provincial agencies. Animal health programmes are focused on the monitoring and detection of diseases and providing support to smallholders regarding disease control. Key to this are annual targets for the distribution of vaccines and other veterinary services to reduce the prevalence of animal disease with the aim of improving animal productivity and food safety and decreasing transmission of zoonoses. In response to the recent outbreak of foot and mouth disease, programmes have also focused on culling of infected animals to reduce disease transmission. While government programmes often prioritise highly infectious, zoonotic, and transboundary diseases (Table II), inadequate nutrition and sub-optimal animal management also contribute to production and reproductive losses [4,6]. The GBADs programme is thus well positioned to inform animal health and more general agricultural policies by offering a methodology to quantify impacts the economic and food security impacts of disease and other livestock production challenges.

# Initiating the Indonesian case study

As one of the early GBADs case studies, there was no established process for us to follow in setting up the project team or designing the programme of work to be completed. Two key activities were undertaken. First, a short scoping study was commissioned to better understand priorities of the Indonesian livestock sector, determine the availability of potential data sources, and identify important collaborators. Following this, key staff from Indonesia and Australia met regularly (often weekly) for ~10 months to develop the research proposal and apply to the Australian Centre for International Agricultural Research (ACIAR) for funding. While restrictions associated with the COVID-19 pandemic meant that meetings had to be conducted virtually, and the proposal development process took longer than anticipated, the time invested from both countries in planning the research meant that the proposal was a truly collaborative process, and the team were able to establish strong working relationships in advance of starting project activities.

#### **Partnerships**

Selection of a strong in-country partner to lead GBADs case studies is critical to their success. The Indonesian case study leader, the National Research and Innovation Agency (Badan Riset dan Inovasi Nasional, BRIN), is a consolidation of Indonesia's government research agencies, including agricultural, veterinary, and public health sciences. As a national agency, BRIN contribute expertise across the diversity of

livestock species and production systems found in Indonesia, whereas universities tend to have a narrower geographic and academic focus. Being a government agency, BRIN also have a mandate for nationally relevant research that brings industry impacts – they inform, yet are independent of, the Ministries that set policies and regulations relating to the management of livestock and disease (e.g. Ministry of Agriculture, Ministry of Trade, Ministry of Health). Collaboration with the Universitas Gadjah Mada, Commonwealth Scientific and Industrial Research Organisation (CSIRO), PT Mitra Asia Lestari and Griffith Asia Institute brings additional expertise to support the BRIN research team.

A similar strategy has been employed in the Global Burden of (human) Diseases Indonesian case study, which BRIN also contribute to [8]. In both programmes, the national research team work with global research partners to adapt and apply existing research methods, and with industry and government to ensure the case study uses the best available data and produces outputs that are useful to policy makers (Figure 1). In particular, the Indonesian research team have received support from the GBADs methods themes and Ethiopia case study team. The themes have developed methods and provide guides for their use, and the Ethiopian team have shared their experience in the local implementation of these methods. In turn, the Indonesian team continue to adapt the GBADs methods in response to differing local production systems and data, further refining the GBADs approach.

It is also important to draw attention to the value of multidisciplinary research teams in GBADs case studies. While the bulk of the Indonesian case study team have specific expertise in animal health, epidemiology and economics, the team also purposively includes researchers with expertise in social science, policy assessment, relationship brokering, and livestock production more generally. This allows the case study to holistically assess the burden of animal disease within Indonesia and extend our assessments to include metrics not yet covered in other case studies (e.g. quantification of the environmental impacts of animal disease). This helps to extend GBADs impact and shape future case studies, with the specifics of each analysis targeted to the needs of a particular country.

#### **Case study priorities**

Given the short timeframe for this initial case study (2 years), and the huge diversity of livestock production systems within Indonesia, the case study team decided to prioritise a small number of livestock systems and geographies for this initial analysis; beef production in East Java, poultry and dairy production in West Java, and pig production

in East Nusa Tenggara. These systems were selected in consultation between the GBADs partners and provincial governments, with the selection designed to include highpriority systems for the Indonesian government as well as providing diversity in data availability and quality, and the types of diseases and production problems that contribute to the health loss envelope.

The benefit of this approach is that rather than being overwhelmed by the enormity of the task, the case study team can focus on building their skills and creating a high-quality analysis for a small number of systems. The decentralised system of government within Indonesia means that these initial case study results will be of value to animal health decision makers, and the GBADs approach can then be extended to other livestock and provinces in subsequent phases.

The longer-term intention is that capacity is built to the extent that methods can be applied on a regular basis to generate longitudinal datasets that allow high quality expost and ex-ante analyses of current, and potential future, animal health investments. This is being achieved through mentoring and training from the global GBADs teams; documentation of processes in living guides which provide an on-going resource; and engagement with other case studies and researchers working in the animal health economics space.

# Key learnings for future case studies

Based on our experience so far, we have identified the following key learnings that may be of use in the development and implementation of future GBADs case studies.

Firstly, it is important to acknowledge the complexity of the GBADs programme in the early stages of project development, and not underestimate the time it takes to establish understanding and to develop joint approaches. This includes building understanding of all aspects by all parties in the establishment, so there is not only ownership, but no confusion as to why, or who, needs to be involved. Understanding the local context and political framework is critical – we used knowledge of local policies and priorities to guide our focus. The use of regional analyses make sense in Indonesia where there are decentralised systems of governance, but this approach may not be universally applicable.

Secondly, it's important to engage with end users including government agencies, policy makers, and industry groups early and often to understand how GBADs outputs can be used to inform their decisions [9]. Insights from external stakeholders can be used to

inform project outputs and how they are conveyed. We highlight that animal disease matters can be extremely sensitive, and it is therefore valuable to convey to partners and stakeholders that GBADs is focused on measuring impacts rather than reviewing diseases.

Regular meetings between project partners are key to maintaining momentum, ensuring there is progress without confusion or duplication of effort, and quickly dispelling any misunderstandings. Consider language, both in terms of national languages and technical terminology. Where a complex concept is being developed, ensure in the early stages that a clear and simple message is developed regarding the programme's objectives and the benefits. This makes it easier to communicate the purpose of the project with both project participants and external stakeholders.

Finally, case study teams need to be aware of local regulations relating to international research projects. This could include research permits or visas for foreign researchers, and research ethics approval where the case study includes expert elicitation processes or personal information.

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#### Table I

#### Indonesian livestock population and production in 2022 [1]

Species are ranked by volume of total production

	Population	Volume of animal products produced (million tons)			
	(million - heads)	Meat	Eggs	Milk	Total
Layers	379	0.17	5.56	_	5.73
Broilers	3,168	3.77	-	-	3.77
Dairy cattle	0.59	-	-	0.97	0.97
Native chickens	314	0.28	0.38	-	0.66
Beef cattle	18.6	0.50	-	-	0.50
Ducks	58.4	0.04	0.36	-	0.40
Pigs	7.28	0.26	-	-	0.26
Goats	19.4	0.06	-	2	0.06
Sheep	15.6	0.05	-	-	0.05
Buffalo	1.17	0.02	-	_	0.02

#### Table II

# Key animal health problems impacting livestock production in Indonesia [7]

Zoonoses are identified in *italics*. All strategic diseases are also notifiable diseases

Species	Strategic diseases	Notifiable diseases	Other health problems
Poultry	Avian influenza	Avian chlamydiosis Avian infectious bronchitis Avian infectious laryngotracheitis Avian mycoplasmosis Fowl typhoid <i>Newcastle disease</i> Infectious bursal disease Pullorum disease Salmonellosis	Egg drop syndrome Other respiratory infections
Beef cattle Buffalo Dairy cattle	Anthrax Brucellosis (Brucella abortus) Bovine viral diarrhoea Foot and mouth disease Haemorrhagic septicaemia Infectious bovine rhinotracheitis Jembrana disease Leptospirosis Lumpy skin disease Salmonellosis Trypanosomiasis Zoonotic tuberculosis	Bluetongue Bovine anaplasmosis Bovine babesiosis Bovine genital campylobacteriosis Bovine tuberculosis Cochliomyia hominivorax Contagious bovine pleuropheumonia Chrysomya bezziana Cysticercosis Echinococcus granulosus Enzootic bovine leukosis Epizoonotic haemorrhagic disease Heartwater Mastitis Paratuberculosis Pseudorabies Q fever Theileriosis Trichomoniasis West Nile fever	Inadequate nutrition Other internal and external parasites Metabolic diseases (e.g. ketosis)
Sheep Goats	Anthrax Brucellosis (Brucella ovis) Foot and mouth disease Leptospirosis	Bluetongue Caprine arthritis <i>Cochliomyia hominivorax</i> <i>Chrysomya bezziana</i> Contagious agalactia Contagious caprine pleuropneumonia <i>Chlamydophila abortus</i> <i>Echinococcus granulosus</i> Heartwater Paratuberculosis	Inadequate nutrition Other internal and external parasites

		Pseudorabies <i>Q fever</i> Salmonellosis Sheep and goat pox West Nile fever	
Pigs	African swine fever Brucellosis (Brucella suis) Hog cholera (classical swine fever) Porcine reproduction and respiratory syndrome	Cochliomyia hominivorax Chrysomya bezziana Nipah virus encephalitis Japanese encephalitis Swine erysipelas Porcine cysticercosis Pseudorabies Transmissible gastroenteritis Trichinella	Inadequate nutrition
		West Nile fever	



#### Figure 1

# Schematic flow of information between the Indonesian case study and key stakeholders

Inputs and outputs are indicated by the dotted blue and orange dashed lines, respectively

GBADs: Global Burden of Animal Diseases