

Bridging the Technology Gap for ASEAN Livestock Production¹

Joachim Otte

FAO, Regional Office for Asia and the Pacific, Bangkok, Thailand

INTRODUCTION

ASEAN is one of the fastest growing regional economic communities and its combined human population of around 600 million people is larger than that of the European Union. Heterogeneity prevails however and ASEAN member countries are rather diverse in many aspects and large disparities exist in population sizes, cultural backgrounds, structure and development of the economies, and levels of disposable income. Likewise, large differences exist in the structure of the livestock sectors of ASEAN members and their respective levels of technology adoption. Large technology gaps in animal production practices exist between ASEAN countries and even within countries. It is thus necessary to clearly identify critical technology gaps and to specify the rationale for attempting to bridge the gaps before embarking on major technology development / adaptation and dissemination programmes. This paper first attempts to provide a succinct overview of the livestock sectors of ASEAN countries and their development trends over the past decade. The paper will then review these livestock sector developments with a ‘sustainability lens’ to conclude with some recommendations on areas in which new technologies need to be deployed and / or developed.

ASEAN LIVESTOCK SECTORS: STRUCTURE AND TRENDS

Table 1 displays the value of livestock production of ASEAN countries (excl. Brunei Darussalam, Myanmar, and Singapore, for which values are not available) in 2011. Total value of livestock production for the seven ASEAN countries amounted to roughly US\$ 60 billion, with Indonesia accounting for nearly 40 percent of the total. With respect to livestock commodity, poultry and pig meat each roughly account for 33 percent of total value, followed by eggs (app. 14 percent), making the poultry sector the largest livestock subsector in ASEAN.

Table 1. Value of livestock production in 2011 by country and by livestock product

Country	Value of production (billion US\$)	Livestock product	Value of production (billion US\$)
Indonesia	22.92	Poultry meat	20.84
Viet Nam	11.04	Pig meat	19.20
Philippines	9.93	Eggs	8.44
Thailand	9.04	Cattle / buffalo meat	6.88
Malaysia	5.16	Cow milk	1.99
Cambodia	0.99	Sheep / goat meat	1.56
Lao PDR	0.26	Other	0.48

Source: FAOSTAT

Note: Values for Brunei Darussalam, Myanmar and Singapore not available

¹ Keynote paper presented at the 1st ASEAN Regional Conference on Animal Production, Kuching, Malaysia, 4 – 6 June 2014

With more than 40 percent of livestock product value share, pork dominates the livestock sectors of Viet Nam, Cambodia and Lao PDR, while poultry (meat and eggs) account for 50, 60, and 80 percent of the livestock product value share in Thailand, Indonesia and Malaysia respectively.

As can be seen from table 2, in 2012 ASEAN pig populations amounted to 71 million, an increase of 36 percent since the year 2000, while over the same period chicken populations increased by 74 percent to 2.7 billion. Increases in pig meat, chicken meat and egg production were generally higher than the respective increase in animal populations, indicating improvements in per animal production. The increase in per animal output has been higher in the pig than in the poultry sector.

Table 2. Pig and chicken populations, pig meat, chicken meat and chicken egg output in 2012 and aggregate 2000-2012 growth by country

	Pigs (million)		Pig meat (1 000 tons)		Chicken (million)		Chicken meat (1 000 tons)		Chicken eggs (1 000 tons)	
	2000	2012 (%)	2000	2012 (%)	2000	2012 (%)	2000	2012 (%)	2000	2012 (%)
Cambodia	2.1	9.6	93	-11.6	14.4	-5.3	19	-3.1	19	58.1
Indonesia	7.8	46.2	751	74.2	1,552.1	80.6	1,752	117.2	1,059	65.0
Lao PDR	2.8	93.2	58	109.8	28.8	119.8	20	111.2	16	60.0
Malaysia	1.8	-0.5	236	47.4	251.8	103.6	1,279	79.2	643	64.5
Myanmar	10.5	164.2	620	404.3	180.0	302.2	1,080	408.3	380	239.3
Philippines	11.9	10.7	1,678	38.3	164.2	42.5	947	78.1	421	73.0
Thailand	7.5	14.4	1,066	53.6	247.2	10.0	1,263	20.2	656	27.5
Viet Nam	26.5	31.2	3,160	124.4	223.7	63.0	524	77.8	350	88.8
TOTAL	70.9	36.4	7,661	84.1	2,662.3	73.6	6,884	89.2	3,543	68.0

Source: FAOSTAT

As can also be noted from the table, proportional changes vary widely between countries, with some countries showing very high animal population and even higher output growth rates while decreases in animal populations and / or output are recorded in other countries. Improvements in per animal production are an indication of livestock sector intensification, which is characterised by increasing size of livestock farming units and their concentration in proximity of feed sources, increased animal throughput / turnover and stratification of production (breeders, multipliers, finishers), often with vertical integration and contract farming. Increases in animal turnover in intensive livestock production systems are the result of selection for production traits, enhanced management, particularly disease control, and feed rations with a higher nutrient density compared to traditional livestock raising systems.

Despite the impressive increases in total livestock sector output and per animal production, ASEAN dependency on imports of livestock products and animal feed is increasing, as can be seen in table 3. Although ASEAN as a whole is a net exporter of poultry meat, eggs and pig meat, the value of net imports of livestock products and feed has risen from US\$5.8 billion in 2009 to US\$9.1 billion in 2011. Animal feed accounts for the largest share of the import bill (app 50 percent), followed by milk and dairy products, where the import bill has nearly doubled over the three year period. Within ASEAN, Thailand is the only country with a positive overall total trade balance in

livestock products and feed, due primarily to its internationally highly successful poultry (meat) sector.

Table 3. Net value of ASEAN imports of livestock products and animal feed (million US\$) 2009, 2010, and 2011

	2009	2010	2011
Eggs	-109.10	-110.96	-127.78
Poultry meat	-1,271.17	-1,128.24	-1,098.72
Pig meat	-20.17	-26.69	-38.56
Animal feed	4,473.55	4,749.95	5,167.17
Cattle / buffalo meat	927.99	1,097.27	1,636.89
Milk equivalent	1,708.08	2,793.60	3,463.41
Sheep / goat meat	79.87	139.41	138.35
TOTAL	5,789.06	7,514.34	9,140.76

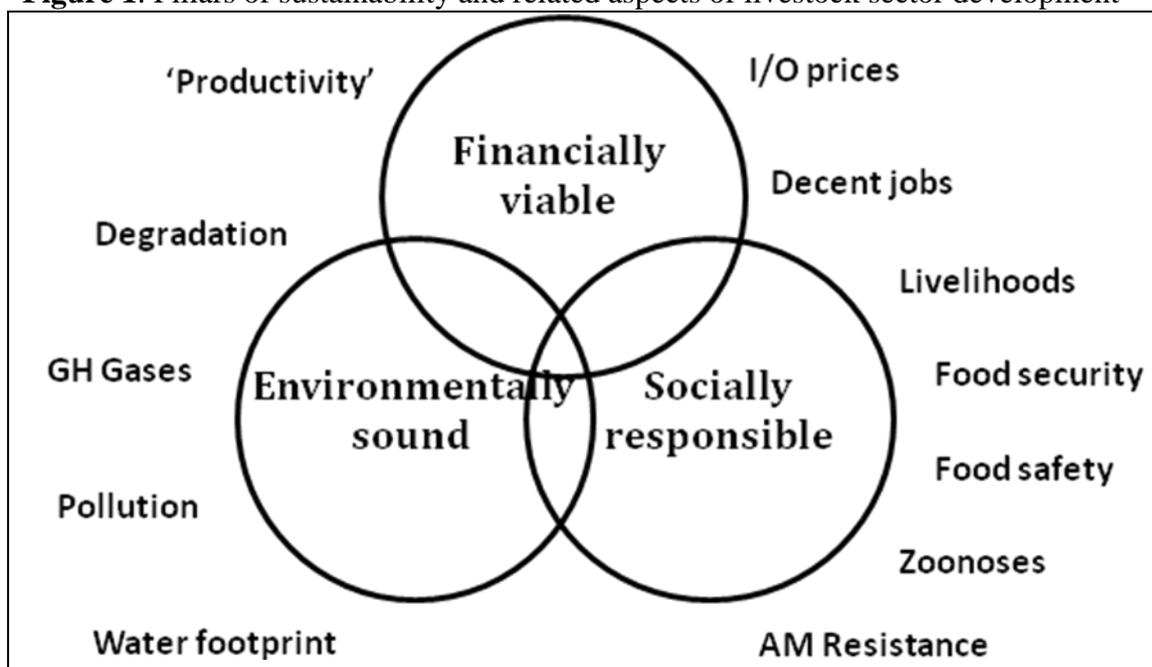
Source: FAOSTAT

Given ASEAN's import dependency for livestock products and animal feed is increasing despite the overall remarkable increases in livestock populations and per animal output, some effort would be warranted to define ASEAN's livestock sector development goals and tailor the policy and institutional support accordingly.

LIVESTOCK SECTOR DEVELOPMENT: SYNERGIES AND TRADE-OFFS

Livestock provide an array of valuable products and services to society but these do not come without downsides and unregulated livestock sector development can have major negative side effects. Growing human populations and even faster growing per capita demands on natural resources call for heightened attention to sustainability aspects of industry development. Figure 1 provides a diagrammatic overview of the three pillars of sustainability and related aspects of livestock sector development.

Figure 1. Pillars of sustainability and related aspects of livestock sector development



It should be noted that only the small area where the three circles overlap represent the 'space' for 'sustainable development. Furthermore, the 'space' for sustainable development is context specific and context is not static – for example, measures that are financially viable in one country may not be so in another country and what is financially viable at one point in time may not be at another point in time. It should also be noted that the concept of 'productivity', so central to the world of animal production, and often misunderstood as output per animal, primarily relates to the 'financial sustainability' pillar while issues pertaining to the other two pillars are seldom factored into 'productivity' considerations.

The relationships between the financial, ecological and social sustainability and their component aspects are seldom straightforward and can be neutral, synergistic or antagonistic. For instance, labour regulations in support of 'decent' jobs may reduce 'financial' viability, while enhancing labour productivity through technology adoption may lead to more 'decent' jobs but at the same time reduce the number of jobs in the sector and thereby negatively affect the livelihoods of a segment of society. Measures put in place to protect the environment may reduce the risk of emergence of zoonotic diseases and thereby support the 'social sustainability' pillar. Given these complexities, the specifics of these relationships need to be carefully assessed on a case-by-case basis rather than relying on generalizations.

The following will provide a brief overview of some issues that are central in the current debates about livestock sector development, namely greenhouse gas (GHG) emissions, pollution through manure, food safety, antimicrobial resistance, and emerging infectious diseases.

ASEAN's direct GHG emissions from livestock (enteric fermentation and manure) have grown in line with overall livestock sector growth and stood at around 200 kg CO₂eq per person in 2011. This value still compares very favourably with respective *per capita* emissions of the EU and the USA, which were around 570 and 730 kg CO₂eq per person. (In ASEAN, GHG emissions from rice production outstrip those from livestock by a wide margin.)

The amount of manure produced annually by livestock in ASEAN has grown from 50 million tons in 2000 to 70 million in 2012. This translates to an average manure load of 5.5 t/km² of agricultural land per year, compared to 3 and 9 t/km² of agricultural land in the USA and EU respectively. These average values do not provide sufficient information to assess whether significant point source pollution is an important problem within ASEAN as a whole. However, Viet Nam, for example, with manure excretions of around 10 t/km² of agricultural land, has recognized pollution from livestock operations as a problem that needs to be urgently addressed.

Food safety is another emerging area of concern and livestock products, mostly un- or undercooked meats, are frequently implicated in food-borne disease outbreaks. Surveys conducted in ASEAN countries reveal relatively high microbial contamination rates of livestock products, both in traditional markets, but also in supermarkets. In Indonesia and Viet Nam for instance, roughly half of all tested chicken meat and egg samples were contaminated with *Salmonella spp.*

Intensification of livestock production has been accompanied by an increasing use of antimicrobials, often administered via animal feed for disease prevention and growth promotion. Although figures on actual antimicrobial use in livestock production in Asian countries are difficult to obtain, in 2011, Asia as a whole accounted for nearly

half of global antimicrobial sales valued at US\$3.6 billion. The bulk of antimicrobials are used in pig and poultry production and antimicrobial resistance rates of Asian *Campylobacter spp.*, *Salmonella spp.*, and *E. coli* isolates from pigs and poultry are significantly higher than in the USA and the EU.

Growing livestock populations and the expansion of livestock production into wildlife habitats favour the exchange of potentially pathogenic micro-organisms between wild and domesticated animals while large populations of genetically homogenous livestock, concentrated in small areas, and with rapid population turnovers favour the selection of virulent variants of common animal pathogens. HPAI and virulent PRRS testify to the reality of these threats, which undermine the sustainability of specific livestock sub-sectors.

CONCLUSIONS AND RECOMMENDATIONS

Within ASEAN, the livestock sector has grown significantly over the past decade and at the same time production models from industrialized countries have been adopted to varied extents in ASEAN member countries and livestock sub-sectors. Despite this undeniable progress of the sector, ASEAN's import dependency on animal food products and animal feed is growing. Thus, this paper argues that technology adoption, or 'modernization', should not be a goal on its own right but should be promoted in pursuit of broader societal goals and needs to be tailored to specific contexts. A one-size-fits all approach is unlikely to lead to success.

In line with the above public goods focus, this paper uses the 'sustainability' framework with its social, environmental and financial components to review some aspects of ASEAN livestock sector development and draw conclusions. The 'per-animal' output metric, often proclaimed to reflect 'productivity', is a poor guide to direct technology adoption and livestock sector development as it ignores many, if not most, of the elements of sustainability. A comprehensive metric of livestock sector 'productivity' should account for livestock's wider services and disservices to society. Directing ASEAN's livestock sector development on a pathway to sustainability would require a comprehensive policy package which would be willing to sacrifice on per-animal output and strive to:

- Capitalize on heterogeneity and comparative advantage in livestock production;
- Enhance utilization of local feed resources and balance feed needs with feed availability;
- Balance manure production with absorption capacity of agricultural land;
- Reduce the risk of disease emergence and spread;
- Reverse the widespread prevalence of antimicrobial resistance;
- Enhance the safety of animal source food;
- Utilize the livestock sector to raise rural incomes and living standards;
- Provide an enabling environment for appropriate technology development / adoption.

With regards to technology development and / or adoption, the above would call for research and extension to:

- Enhance the nutrient content and / or digestibility of local feed resources, mainly agricultural by-products but also food waste;

- Improve formulation of balanced rations drawing on local feedstuffs;
- Breed for the capacity to digest lesser quality feeds;
- Promote cost-effective practices of manure management;
- Develop of vaccines and other alternatives to antimicrobials to control diseases of intensification;
- Capitalize on advances in information and communications technology in support of family farms.