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LIVESTOCK SELF-SUFFICIENCY AND LIVESTOCK HOUSEHOLD DISTRIBUTION IN INDONESIA: CURRENT STATE AND EXPECTED DEVELOPMENTS

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Abstract: Indonesia has increasing demand for animal sources of food including red meat. There has always been a national gap between supply and demand of red meat. This paper aims to describe the current features and prospects for livestock production systems in Indonesia. The research method used is descriptive statistics. Based on the source, the data used in this study is secondary data from the Central Statistics Agency (BPS). The first part of the article reviews and analyses population of Indonesian livestock. The second part addresses issues related to the current distribution of livestock that could become important for future development of the livestock industry in Indonesia. Recommendations to improve distribution, to empower smallholder farmers, and to develop systems for livestock development are briefly discussed.

Keywords: self-sufficiency, livestock distribution, smallholder farmer.

TERNAK MANDIRI DAN DISTRIBUSI TERNAK RUMAH TANGGA DI INDONESIA: KONDISI SAAT INI DAN PERKEMBANGAN YANG DIHARAPKAN

Abstrak: Kebutuhan pangan sumber hewani termasuk daging merah semakin meningkat di Indonesia. Selalu ada kesenjangan nasional antara pasokan dan permintaan daging merah. Makalah ini bertujuan untuk mendeskripsikan fitur dan prospek sistem produksi ternak saat ini di Indonesia. Metode penelitian yang digunakan adalah statistik deskriptif. Berdasarkan sumbernya, data yang digunakan dalam penelitian ini adalah data sekunder dari Badan Pusat Statistik (BPS). Bagian pertama artikel mengulas dan menganalisis populasi ternak Indonesia. Bagian kedua membahas masalah-masalah yang berkaitan dengan distribusi ternak saat ini yang dapat menjadi penting bagi perkembangan industri peternakan di Indonesia di masa mendatang. Rekomendasi untuk meningkatkan distribusi, memberdayakan petani kecil, dan mengembangkan sistem pengembangan peternakan dibahas secara singkat.

Kata Kunci : swasembada, distribusi ternak, petani kecil.

INTRODUCTION

Indonesia, with the 250 million of people is the fourth largest country in terms of population. Current average meat consumption of 2.72 kg/capita/year is projected to reach 3.36 kg/capita/year in 2024 due to steadily growing population, income, and animal protein consumption. The increasing demand for meat has not been matched by domestic beef production, the supply of which is less than 60% of the national demand for beef (1). The gap between beef supply and demand is expanding. Live cattle and frozen meat imports are an easy solution in the short medium term. Government efforts for more than 15 years to develop domestic beef cattle production for Indonesian self-sufficiency are yet to realize the objective of

self-sufficiency in meat production and distribution. Population growth, urbanization, economic progress and changing consumer preferences are boosting the demand for livestock products in developing countries (2). Indonesia is a developing country, with high population growth and economic progress being the major driving forces for growing demand for animal sources of protein (3). With the majority of consumers being Muslim, beef and chicken are the most common meat proteins in Indonesia (4).

The cattle population in Indonesia is currently about 16.6 million head (5), of which 43% is in Java Island, 25% is in the Eastern Islands, and the remaining 32% is on other islands spread around Indonesia. Human population is expected to increase from the current 251 million to 274 million by 2020. Average meat consumption is 2.72 kg per capita per year and is expected to increase to 3.36 kg per capita per year by 2020 (6). Java has the highest production and consumption of beef, with 57% of the Indonesia's population living on this island (7). In Indonesia, 90% of cattle production is from smallholder farming systems with about 6.5 million farmers living in the rural areas, and the remaining 10% is from more commercial farmers (<1% of all farmers) and large beef cattle companies whose target market is concentrated in Java island (8). The most prevalent type of livestock production in the area could be characterized as small-scale livestock operation, either by landless households or those with <0,4 ha of land (9). This paper reports the results of the general household survey based on secondary data from Central Bureau of Statistics of Indonesia on 2013. The objective of this paper was to determine subjects and designs for-in-depth analysis on major aspects of livestock distribution system.

METHODS

Data Collection Method used in this research is a descriptive method with a quantitative approach, which is a research method that emphasizes analysis of the actual problem with data in the form of numbers.

Types and sources of data used in this study are secondary data taken from official government publications. The data used is panel data obtained from the Central Statistics Agency (BPS). Data from BPS comes from agriculture and livestock census in 2013. Data Analysis Techniques used in multiple factor analysis was used to analyze data.

RESULTS AND DISCUSSION

1. Outlook of Livestock in Indonesia

In Java Island, smallholder farmers own between two and four cattles, coupled with integrating crop and livestock production and the use of stall feeding (3). While in other areas (i.e. Eastern Islands: Nusa Tenggara Timur), smallholder farmers may have more than 5, or over 50 cattle, since source of food for livestock is plentiful. These cattle are kept in extensive systems. The importance of livestock for smallholder livelihoods around the world is well understood (3). The benefits of keeping livestock are particularly important for the low-income household. In Indonesia, smallholder farmers do not only keep cattle to produce meat for the urban market, to support cropping with manure and draught power, but as livelihood assets as well. The livelihood benefits of keeping cattle also include savings, buffering, insurance, and cultural benefits. Cattle farming forms are not only an income benefit, but also part of farmer pride.

In the rural areas of East Java, Indonesia, ruminants provide farming households with tradable assets in addition to manure and draught power (10). Cattle are the most preferred ruminant because they give a higher income than goats and sheep. Three types of livestock farm can be distinguished i.e. farm keeping their own animals only, those keeping owned and shared animals or those keeping owned and shared animals, or those keeping shared animals only. In this paper, we do not have the percentage of each category because the BPS did not do census on it.

Households are interested in acquiring ruminants at an early stage of household development.

The farmers` access to cattle via sharing arrangements. In these arrangements, owners lend animals to other farmers in return for a share of the offspring or the profits. Most farmers opt for the production of progeny and manure as their first objective in rearing livestock. Followed by providing draught power and savings (10).

Livestock owners only entrust cattle to households with prior experience in livestock keeping and sufficient labour. A sustainability assessment research based on the FAO-SAFA (Food and Agricultural Organization-Sustainability Assessment of Food and Agriculture Systems) has been conducted (11). The results showed that the SAFA sustainability performance generally scored better in the farming system with relatively more resources and hired labour, and the household head also working as middleman, as compared to the other two farming systems with some or no hired labour. These results indicate that the larger room for sustainability improvement relies in the farming systems with only family labour. Lack of information, training and economical resources showed to be two main drivers that explain part of these differences. These results suggest that the government should be more responsible in increasing awareness, providing information and training and facilitating sustainable development practices.

Changes in cattle numbers and ownership over time are attributed to patterns of the development of village agriculture and the economic development of farming households. Feed shortages in the dry season bring about short-term changes; cattle numbers decline and the proportion of households rearing shared cattle increases. The institution of sharing plays a major role in replenishing herds after periods of severe drought.

Table 1. The total of households keeping ruminant according to ownership between 2003-2013

Ruminants	Households (Hh)	Population	Population per Hh
1. Cattle	5.078.979	12.329.477	2,43
2. Goat	2.728.487	13.491.190	4,94
3. Sheep	645.561	3.782.046	5,86
4. Buffalo	328.899	1.085.450	3,30

Sources: The Central Bureau of Statistics Indonesia (2013), reprocessed.

The number of household businesses in the livestock subsector nationally in census 2013 was 12,969,206 units, a drastic decrease from the results of the previous 10 years census of 30.3% (in 2003, the number of livestock household businesses was 18,595,824 units). 960,773 livestock business households or around 7.4% of the national livestock household figures are recorded as livestock households as the main source of income. Thus, there is a ratio of approximately 12 livestock households to one that is not the main source of income. Cattle business reached 5,078,979 households (Hh), 2,728,487 Hh goats, sheep 645,561 Hh, and buffalo 328,899 Hh. In this case, nationally, the condition of buffalo and sheep business level is much lower compared to beef cattle and goats. The largest population of livestock is owned by sheep farmers (5.86 per Hh), goats (4.94 per Hh), buffalo (3.3 per Hh), and cattle (2.43 per Hh). This illustrates that in livestock business, each household has an inventory of 5-6 sheep, 4-5 goats, 3-4 buffaloes, or 2-3 cattle.

The population distribution can also be used to estimate potential livestock producers. Portions of population who are staying in rural areas have their predominant source of income from the agriculture sector including livestock subsector. This agricultural population becomes a good indicator as potential agricultural including livestock producer. For example, Indonesia, Vietnam, Myanmar, Thailand, and the

Philippines are among member countries with higher portion of people working in agricultural sector, which is indicated by respective agricultural population (12).

Data from the Indonesian Directorate General of Livestock (DGLS) in 2010 shows that local breeds of cattle in Indonesia consist of Bali cattle (33.73%), Ongole Crossbred (5.16%), and other local breeds (13.45%) (13). Bali cattle and Ongole Crossbred are local breeds of beef cattle that have a particular strength, which make them be able to adapt very well and quickly to the surrounding environment in Indonesia, such as the climate, the availability of natural fodder and water, and the resistance to bacteria and parasites (14).

Most Indonesian cattle are found in Java, which is around 45% of all local cattle (35% are in East Java). Sumatra owns about 22%, Nusa Tenggara and Sulawesi each owns 13%, and the rests are raised in other islands. Bali cattle have been brought to most provinces in Indonesia because of their suitability and high adaptability to most agro-climatic zones. Other important breeds are the Ongole Crossbred, Madura cattle, and the Holstein Friesians dairy cattle (Bos taurus). The most popular breeds to be mixed with local breeds, especially Ongole Crossbred, are Simmental and Limousin. The offspring of this crossbreeding are highly preferable for fattening due to their high rate of weight gain despite the relatively high cost of production. Most cattle that are sold across islands will usually end up in Jakarta and West Java, as the main consumers (15).

2. Provincial Conditions of Livestock Business

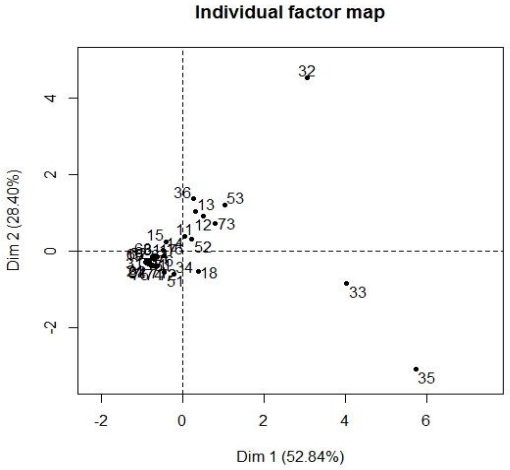

Fig. 1. Individual factor map

Based on the figure 1, livestock are distributed unequally among provinces in Indonesia. West Java (32), Central Java (33), and East Java (35) are the main producer of livestock. Given various challenges discussed in the earlier sections and the outcome of the analysis presented by this study, there is concern about the long-term effects of current government approaches to reaching livestock self-sufficiency target. The long-run effect of unequal livestock distribution would affect the subsequent significant increase in prices. The effect will be even greater if one takes into account the political context of such a free trade policy. Furthermore, if Indonesia government decides to allow livestock imports, the country would face a greater challenge to control livestock distribution. In such condition, instead of

achieving the livestock self-sufficiency target, Indonesia will be dealing with a more unequal livestock distribution. The livestock distribution gap between Java island (most populated area) and another island would be widened because Java is the main target of livestock distribution in order to fulfil the high demand of meat.

Government policy on farmer's level, are usually addressed to increase domestic cattle population and beef meat production, and to improve economic condition of smallholder farmers. However, unfortunately, the programs were applied while the meat importation program is still running. One could consider that the government policies regarding meat sufficiency are contradicting each other to a certain degree and thus, are not efficient. Beef imports can stabilize the price of domestic beef, but on the other hand it can reduce the income of local farmers. In the future, political will, domestic product orientation, prioritizing small farmers through partnership, integrated farming, franchise system, livestock development project management unit are necessary to boost livestock industry (16). Other attempts to take by the government are special credit scheme for livestock development, grassing field development, livestock breed supply through breeding farm system development, effective and accountable livestock development management. The government needs to reformulate cattle development road map to accommodate internal and external environment issues, and to emphasize the goals of livestock industry development, such as increasing cattle population, enhancing meat product, improving cattle farmers' income, and sustaining cattle meat self-sufficiency. The relative increase in GDP per capita is associated with increased demand for beef and cattle imports relative to domestic cattle breeding in Indonesia (17). In addition, imposing tariffs could affect the relative domestic price but not to the extent that increased production capacity does.

A common measure of self-sufficiency in livestock can be misleading because it ignores the types of cattle that the domestic industry produces. The self-sufficiency ratio is normally defined as the ratio of production to production plus imports minus exports (17). One main problem with this approach is that imports may come in various forms. In the case of beef, Indonesia not only imports beef in boxes but also live cattle for various purposes, including slaughter, feeders, and breeding animals. Not all live cattle imports, for example feeders and breeding animals, can be added to "imported beef' calculations of the self-sufficiency ratio. This would overestimate total imports for consumption purposes. Further, cattle brought to Indonesia as feeders and breeding animals will reduce the self-sufficiency ratio. In contrast, failure to include slaughter animals would lead to an underestimation of beef imports, and thus an over-estimated self- sufficiency ratio will be obtained.

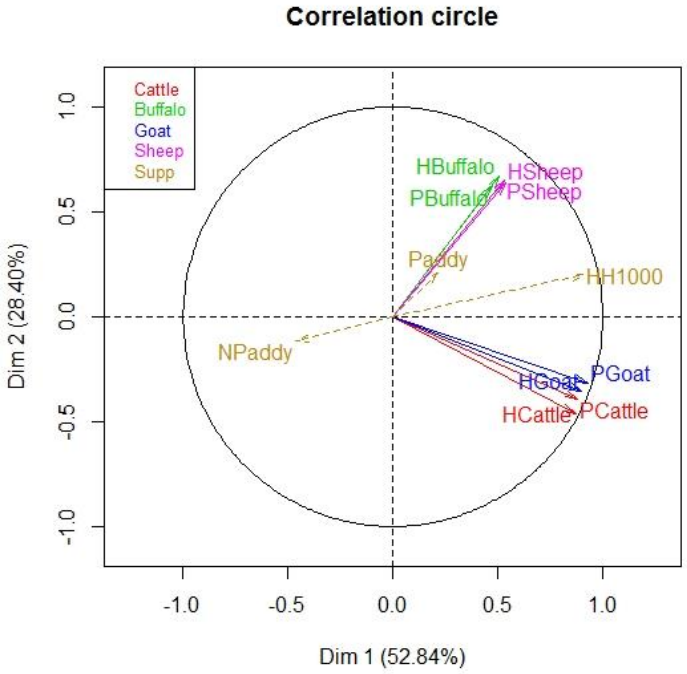

Fig. 2. Variables correlation on the factor map

According to figure 2, the dimension I separates provinces with high-level livestock household with low-level livestock household. The dimension II separates buffalo and sheep core businesses from cattle and goat core businesses

Table 2. Typology of Provinces by Livestock Household

Type	Provinces	Characteristics
I	**West Java** (32), Aceh (11), North Sumatera (12), West Sumatera (13), Banten (36), West Nusa Tenggara (52), East Nusa Tenggara (53), South Sulawesi (73)	High level in Buffalo and/or Sheep ownership, associate with paddy field and demographic population
II	**East Java** (35), **Central Java** (33), Lampung (18)	High level in Cattle and/or Goat ownership, associate with demographic population
III	Other, 23 provinces	Low in livestock ownership, associate with agricultural non paddy field

Table 3. Percentage of contribution of a livestock, variables and provinces to the dimensions

Group/variables/provinces	Dim 1	Dim 2
Cattle	35,7	15,9
Buffalo	11,8	38,6
Goat	39,1	9,8
Sheep	13,4	35,8
Variables:		
Households	49,7	52,9
Population	50,3	47,1
Some individual provinces:		
West Java	12,7	52,2
Central Java	22,2	1,9
East Java	44,9	24,1

Notes: Underline numerical number is negative loading

Table 4. Percentage of Livestock Households and Ruminant Populations in West Java, Central Java, and East Java to National Figures

		Households of Livestock Bussiness						
Codes	Provinces	Livestocks	As Main	Cattle	Dairy	Buffalo	Goat	Sheep
32	West Java	9,2	10,8	2,4	18,4	12,7	5,4	70,8
33	Central Java	20,1	17,8	16,1	30,2	5,9	30,9	16,5
35	East Java	25,7	32,6	37,6	49,5	3,0	31,0	7,9
	Total	55,0	61,2	56,1	98,1	21,6	67,3	95,2
				Population				
				Cattle	Dairy	Buffalo	Goat	Sheep
32	West Java			2,5	21,5	9,6	7,6	71,0
33	Central Java			12,1	24,1	5,5	25,7	14,1
35	East Java			28,8	51,6	2,5	30,8	8,4
	Total			43,4	97,2	17,6	64,1	93,5

Beef cattle business which contribute 53.7% of the national livestock households are in Central Java and East Java, with a population of 40.9% of the national population. The condition of the business and population of cattle in the province of this business can be seen in Typology II, the other province of this business is Lampung. Buffalo business in these 3 provinces is only 21.6% and 17.6% of national population. The provinces and buffalo population (can be seen in Typology I) are 8 provinces. From the raw data, buffalo business is less than 10 livestock household, found in 4 provinces (Riau Islands, North Sulawesi, Gorontalo, and West Papua).

Goat Business is located 61.9% in Central Java and East Java with a population of 56.5% of national population. See Typology II. Apart from Central Java and East Java, other provinces which have this type of business is Lampung. The sheep production and sheep population are 70% located in West Java. The other provinces are at a low or very low level. From the raw data, there are 10 provinces whose ownership of sheep are only 10 household or less. Thus, the business and population of ruminants are concentrated in these three provinces, except for buffalo. In other words, the business conditions and national population are reflected in the conditions of these three provinces.

Table 5. Livestock household in three provinces

ID	Provinces	Cattle		Buffalo		Goat		Sheep	
		Count	%	Count	%	Count	%	Count	%
Households									
32	West Java	120.881	2,4	41.863	12,7	148.066	5,4	456.781	70,8
33	Central Java	817.623	16,1	19.250	5,9	843.837	30,9	106.334	16,5
35	East Java	1.908.037	37,6	9.817	3	844.872	31	50.993	7,9
Population									
32	West Java	311.759	2,5	104.136	9,6	1.020.145	7,6	2.684.782	71
33	Central Java	1.487.529	12,1	59.414	5,5	3.461.409	25,7	533.616	14,1
35	East Java	3.545.493	28,8	27.128	2,5	4.151.397	30,8	316.822	8,4

Notes: %, Percentage based on national data.

The growing food needs of an expanding human population, and the challenges of global climate change, push the government in Asia focusing on the development of sustainable livestock production systems (18). While the livestock industries currently provide enough animal-sourced foods for the global population, there is a need to improve the environmental sustainability of livestock production while increasing productivity to meet future demand. Another fundamental issue facing Indonesia in meeting the domestic beef demand is the distance between production and consumer areas. The majority of production areas are located outside of Java, meanwhile the consumer areas are mainly there (particularly DKI Jakarta Province and its hinterland areas). Consumers mostly prefer fresh over frozen meat. Indications are that the distribution of live cattle production areas to the areas does really matter. The live cattle distribution system is the domain of the government and can be used as an instrument to manage the supply of animal sourced protein particularly in high consumer areas. During distribution/transportation, live cattle can experience stress which reduces their weight. In some cases, this stress might cause the death cattle. A bad distribution system from producer areas to consumer areas causes significant economic losses due to declining livestock productivity and the cost of recovering the health of cattle (19).

Initially, Indonesia utilized country-based systems over the zone-based system. By using this system, only imports from Australia and New Zealand were suitable as these countries have been free from endemic diseases, i.e., foot and mouth disease (FMD) and Zoonosis. Africa, South America, India and China are countries that have not been free from these endemic diseases. As such, before 2016 Indonesia did not import beef from these countries. Indonesia has opened the tap for imports of Indian buffalo meat since 2016 even though the country is not yet free of foot and mouth disease (FMD) status. In order to avoid dependency of imported beef from only a few countries, currently though the use of the zone system means that imports can now be sourced from other countries, such as India. The quarantine processes should be tighter to reduce the possibility of endemic diseases spreading and possibly destroying local farmers. Therefore, the consistency of the supervision must be conducted in order to ensure that no person or party will take advantage from the policy. Until now, Indonesian does not export beef to the world market. This is because the production of local cattle is dedicated to fulfilling demand for beef in the domestic market (20).

Meanwhile, the farmers got income from the livestock production, the creativity of farmers contributed additional household income to increase socio economic benefits. When farmer has more cattle compare to other farmers they usually called richer as the social standard, beside that the farmer's

income will be more than other farmers (21). In addition, the provision of effective extension services to smallholder farmers should be provided by local government to increase their incomes. The improved extension services can significantly enhance the awareness, knowledge, adoption rates and farm productivity of smallholder farmers (22).

Indonesia is lucky to have the support of abundant natural wealth which makes it one of the most competitive countries in the world. This provides an opportunity for the development of the livestock industry. Moreover, the field of animal husbandry has a big role in developing the nation's economy.
The recent regulation imposed by the Ministry of Agriculture of Indonesia is intended to stabilize the beef price, encourage domestic production and to ensure the supply and the stock of beef during peak and normal season. At the same time, the regulation is also to intended to protect livestock farmers from tight competition of the imported meat. However, up until recently beef production cannot meet increasing demand, and beef price in domestic market remain high. Therefore, future strategy of livestock development should be focused more on improving productivity and efficiency of beef production, and supported by an efficient livestock distribution and ownership (23).

CONCLUSIONS AND RECOMMENDATIONS

Self-sufficiency in animal sourced protein will be met if the local production, livestock population, and livestock distribution is sufficient, but the facts, the ability of Indonesian ruminant population to meet the demands continues to decline, year by year. In recent years, the fulfillment of beef demand in Indonesia is still dependent on imports. Beef imports can stabilize the price of domestic beef, but on the other hand it can reduce the income of local farmers. However, farms that are managed domestically and simply will not be able to meet national needs due to low productivity. This study highlights the importance of a careful livestock distribution analysis of the government's current approach to its self-sufficiency programs. Considering their importance, these abovementioned issues should guide future studies.

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