



## Original Article

# Preferences on Breeding Practices and Breeds of Cattle and Goat in Sandakan, Sabah, Malaysia

M. A. M. Yahia Khandoker<sup>1,2</sup>✉, Tasmina Akter<sup>1</sup>, Lam Yai Lan<sup>2</sup>

<sup>1</sup>Department of Animal Breeding and Genetics, Bangladesh Agricultural University, Mymensingh-2202, Bangladesh

<sup>2</sup>Faculty of Sustainable Agriculture, Universiti Malaysia Sabah, Malaysia

ARTICLE INFO	ABSTRACT
<p><b>Article history</b> Received: 27 Apr 2021 Accepted: 10 Jul 2021 Published: 30 Sep 2021</p> <p><b>Keywords</b> Breed, Breed preferences, Breeding practices, Cattle, Goat</p> <p><b>Correspondence</b> M. A. M. Yahia Khandoker ✉: <a href="mailto:yahiakhbg@bau.edu.bd">yahiakhbg@bau.edu.bd</a></p>	<p>This study was to be undertaken to know the farmers' choice on breeding practices and choice of breeds of cattle and goat in Sandakan, Sabah, Malaysia. A total of 100 households were chosen to collect the data. Data were collected from the farmer through a face-to-face interview. Results of the study revealed that only 18% of people in Sandakan, Sabah associated with livestock rearing. The majority of the farmers were young and male. The pooled ratio of breeding males to females for cattle was 1:18 and for the goat was 1:30. For cattle and goat breeding, almost all farmers (100%) practiced natural mating and they have lack knowledge about quality breeding males. For breeding purposes, all of the farmers used their own bull or buck, and almost all farmers retained the same breeding males in the herd for a long time. According to the study, 66.67% of farmers preferred Bali cattle, and 33.33% of farmers preferred Brahman cattle. In the case of goats, the major proportion of farmers (32.56%) preferred cross Boer, followed by Boer 23.26%, Kalahari 16.28%, Feral 11.63%, Cross Jamnapari 6.98%, Cross Katjang 6.98%, Saanen 2.31%. Almost all the farmers (100%) reared cattle and 97.69% of farmers reared goats for meat production. The study indicated that the information gathered from farmers could provide a benchmark for policymakers in planning the sustainable development of cattle and goat production in Sabah Malaysia.</p>
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## Introduction

Agriculture has long been one of the most important income-generating activities in Malaysia. This field includes plantation crops, food crops, livestock, fisheries, and forestry. Livestock is an important aspect of Malaysia's economy as it provides the majority of the country's animal protein and generates revenue for the country's growth (Irani et al., 2001). The total gross domestic product (GDP) for agricultural production which comprising of agricultural, forestry, and fisheries was 7.3% in the year 2019. With a share of 15.9%, livestock was the 2<sup>nd</sup> major contributor to agricultural sector GDP in 2019 (MASR, 2020). Malaysia's livestock industry is divided into two major sectors; ruminant and non-ruminant. The non-ruminant sector consists of poultry and swine which are well developed and commercialized with modern technology and involvement of the private sector (Arshad et al., 2007). However, the ruminant sector comprises cattle,

buffaloes, sheep, and goats are less developed as compared to the non-ruminant sector in terms of technology and production (Arshad et al., 2007).

Malaysia has a wide variety of cattle and goat breeds, they were classified according to their purposes such as meat breeds and dairy breeds. Breeds of beef cattle available in Malaysia were Kedah-Kelantan, Brahman, Nelore, Droughtmaster, Brakmas, Charoke, Bali, and breeds of dairy cattle were Local Indian dairy, Friesian-Sahiwal crossbreds. Meat-type goat breeds included Katjang, Boer, Kalahari while dairy goat breeds included Saanen, Alpine, Toggenberg, Shami (DVS. 2013). They directly contribute to the human population through meat, milk, hide, skin, and fiber, as well as indirectly through manure, transportation, and expenditure (DVS. 2013). Despite the government's promising success in recent years, it is still unable to generate enough for domestic consumption. According to statistics from the

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Ministry of Agriculture and Agro-based industry, data regarding the deficit of demand compared with the production of livestock in Malaysia in 2010 amounted to 3568000 metric tons (Sahar and Chamhuri, 2016). Therefore, Malaysia has highly reliant on the import of ruminant products from other countries such as India, Australia, New Zealand, and Thailand (Hashim, 2013).

Breeding, management and animal welfare advancements can continue to lead to increasing future demand, as well as increased productivity and genetic gains. For many causes, rates of genetic modification have risen in most species in developing countries in recent decades, including more effective computational approaches for estimating animal genetic merit, the broader use of technology such as artificial insemination (AI), and more concentrated selection on objective traits such as milk yield (Simm et al., 2004). Typically, the method of the breeding technique used by the farmer is determined by the farm's production scheme and goals. Farmers in Malaysia conduct both natural mating and AI (DVS, 2013), but livestock AI is still lagging behind due to a number of factors including lack of investment in infrastructure such as bull stations, semen storage facilities, artificial insemination centers, as well as a paucity of well-trained and qualified AI technicians (Raymond and Saifullizam, 2010). Furthermore, the choice of livestock breeds is a crucial factor in livestock breeding strategies, which are based on the viewpoints of farmers. Farmers' decisions are heavily influenced by economic considerations, sustainability, the environment, and animal performance.

In order to improve the livestock industry, the government has formulated various policies and strategies such as National Agricultural Policy and National Agro-food policy, and several programs (Sahar and Chamhuri, 2016). However, the long-term viability of such programs is contingent on producer participation, which is determined by socio-cultural, fiscal, and geographic influences (Ilatsia et al., 2012). A common understanding of which breeds should be advocated and why which type of breeding strategy should be followed in the country would enable the breeder to effectively design sustainable genetic improvement programs. Therefore, the government may provide some kind of services or incentives to the farmers with some knowledge of the result of any breeding practice for long-term stable breed development in the country. This study was, therefore, conducted with the objective to collect opinions of the farmer about the choice of cattle and goat breeds, and breeding strategies they practiced. The basic socioeconomic status of the farmer in Sandakan, Sabah was also taken into consideration. Basically, the study

was aimed at generating baseline information so that the policymakers can consider some of the decisions on the basis of more specific information that will help in intending cattle and goat production and breed improvement strategies in Sabah Malaysia.

## Materials and Methods

### *Study area and duration of the study*

The study was conducted around the Faculty of Sustainable Agriculture (FSA), Universiti Malaysia Sabah (UMS) campus, Sandakan, Sabah to collect the information on farmers' opinions on breeding practices, choice of breeds, and farmers socioeconomic status. The data were collected from the end of April to July of 2016.

### *Data collection method and management of data*

A total of 100 households were taken into consideration for this study but there were only 18 households found to involve in livestock rearing. Before executing this study, a questionnaire was carefully constructed with the study goals in mind. The data collection sheet was divided into three sections; (A) Farmer's information, (B) Breeding practices, and (C) Preferences of breeds. Farmers were then contacted by calling and requesting permission to interview and see them at their farm. The study's goals were explicitly outlined to the respondent at the time of data collection, allowing them to respond openly. Information was taken on age, race, religion, education level, family size, occupation of the farmers, types of breeding practices, breeding facilities, farmers preference of breed, and the following variables were measured using appropriate scales to describe the variables clearly.

### *Measurement of variables*

**Name:** Name was identified according to his or her identity card (IC).

**Sex:** Sex was identified according to his or her IC.

**Age:** The respondent farmer's age was estimated in years from the time of his birth to the time of the interview.

**Race:** Race was identified according to his or her father's and mother's race.

**Religion:** Religion was identified by the religion he or she is following during the time of the interview.

**Education:** The education of the respondent was according to the stage of schoolings such as never attend school, primary school, secondary school, or others.

**Family size:** The respondent's family size was determined based on the actual number of family members, including his wife, children, and other dependents. Each family member received a separate

score. In this case, less than 4 members were considered as small family size, 4-6 members medium and more than 6 members were considered large family size.

Occupation: Agriculture was given a score of one, service was given a score of two, business was given a score of three, and score four was given for others.

Distance: The distance of available breeding male animals from the farm was measured in three categories where less than 1 km was considered as low, 1.0-3.0 km was medium and more than 3.0 km was high distance.

Types of breeding practice: This was measured by whether the farmer bred their animal by natural service or artificial insemination (AI)

The useful life of breeding male: Based on the duration of breeding male kept in the herd, it was measured in terms of two categories (A) Less than five years(cattle) or two years (goat) (B) More than five years (cattle) or two years(goat).

Male and female pooled ratio: This was measured by the total number of breeding males to females on the farm.

#### Statistical analysis

Necessary information collected from the study was coded and recorded in Microsoft Excel. Descriptive statistics such as number, percentage distribution, mean, standard error, etc. were used in describing the variables. All the analysis was performed using SPSS 11.5 (Statistical Package for Social Sciences).

#### Results

##### People involved in agriculture and the socioeconomic status of the livestock owner

Figure 1 demonstrates a household survey scenario of the respondents studied. It appears that Malaysia still has an inadequate number of people involved in livestock production activities, with 82 percent of people not engaged in livestock keeping and only 18 percent involved in livestock rearing among 100 households in the Sandakan area, Sabah, Malaysia.

The socioeconomic status of the farmers is presented in Table 1. From the study, it was observed that among the respondents, 89% were male and 11% were female. The age distribution of the respondents in this program was 55.6 percent young and 44.4 percent old. There were 16.7% Malay, 16.7% Chinese and 11.1% Kadazandusun, 5.6% Bajau, 11.1% Suluk, 5.6% Sungai and 33.3% others by race. From a religious point of view, 55.5% of people were faithful in Islam, 38.9% Christian, and 5.6% Buddha. Half of the respondents (50%) had received in secondary school education, 11.1% diploma level education, and 16.7% attended primary school. The proportion of respondents by family size revealed that more than 75% (77.8%) of respondents belonged to the category of medium family size with 4 to 6 family members, followed by 5.6% small (less than 4 members) and 16.7% large family size (more than 6) categories. In terms of occupation, the majority (83.3%) of the farmers involved in agriculture, 11.1 percent were in business, 5.6 percent were in other activities and none of them was service holder.

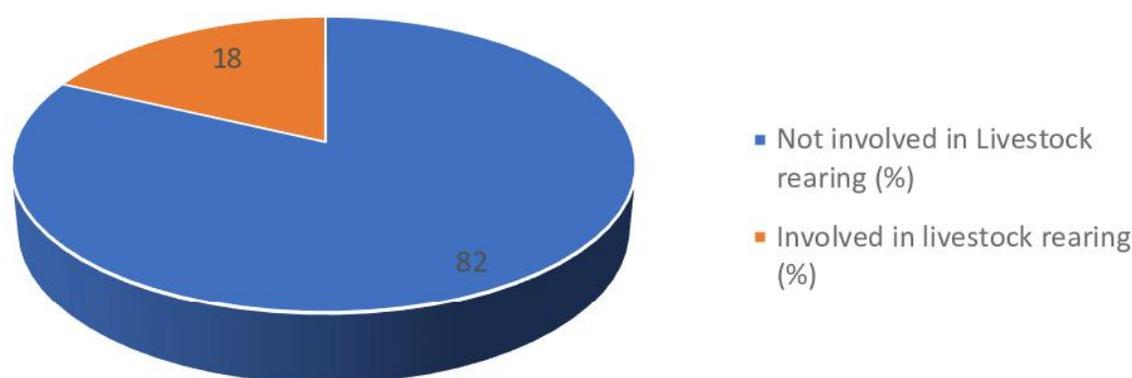


Figure 1. Participation of Sandakan people in agricultural works

**Table 1.** Characteristics of the respondent farmers with categories and basic statistical values

Characteristics	Scoring method	Categories	Respondents (N=18)No./percent	Mean	SE	Frequency
Age	Year	Young (less than 40)	55.6	38.83	1.51	10
		Old (More than 40)	44.4			8
Sex	Type	Male	89.0	1.11	0.07	16
		Female	11.0			2
Race	Type	Malay (1)	16.7	4.94	0.67	3
		Chinese (2)	16.7			3
		Indian (3)	0.0			0
		Kadazandusun (4)	11.1			2
		Bajau (5)	5.6			1
		Suluk (6)	11.1			2
		Sungai (7)	5.6			1
		Others (8)	33.3			6
		Religion	Type			Islam (1)
Buddha (2)	5.6	1				
Hindu (3)	0.0	0				
Christian (4)	38.9	7				
Education level	Year of Schooling	No education (0)	22.2	2.5	0.23	4
		Primary (1-6)	16.7			3
		Secondary (7-11)	50.0			9
		Diploma/STPM or more (12 and above)	11.1			2
Family Size	No. of members	Small (less than 4)	5.6	5.28	0.30	1
		Medium (4-6)	77.8			14
		Large (more than 6)	16.7			3
Occupation	Type	Agriculture (1)	83.3	1.39	0.22	15
		Service (2)	0.0			0
		Business (3)	11.1			2
		Others (4)	5.6			1

#### *The male and female pooled ratio of cattle and goat*

The number and ratio of breeding male and female of cattle and goat are shown in Table 2. The number of bulls was 3 whereas cows were 54. On the other hand, the number of bucks was 47 whereas does was 1432. The ratio calculated for cattle was 1:18 where the ratio for the goat was 1:30.

**Table 2:** Number and pooled ratio of cattle and Goat

Types of livestock	Number of male	Number of female	Pooled Ratio
Cattle	1	22	1:18
	2	32	
Goat	47	1432	1:30

#### *Types of breeding practice and its constraints, service availability, and useful life of breeding male*

There are two categories of breeding practices used by the farmers which were natural service and artificial insemination. The breeding system practiced by the farmers in Sandakan was presented in Table 3. It revealed that 100% of the farmer bred their cattle and goat by natural services.

A list of the spotted constraints associated with breeding is represented in Figure 2. It was observed that 50% of farmers had a problem associated with poor quality breeding bulls or bucks, 33% of farmers

had no constraint regarding breeding and 16.67% of farmers faced problems associated with expensive to get good quality breeding bulls or bucks.

In the Sandakan area, to breed the cattle and goats, service availability facility has been studied and the results of the study presented in Table 3. The result showed that 100% of cattle and goats had service availability of within 1km and all of the farmers used their own bulls or bucks for breeding purposes. It was found that all of the farmers (100%) in Sandakan used their breeding bulls for more than five years. In the case of goats, 81.3% of farmers used their bucks more than two years and only 18.7% of farmers used their bucks less than two years.

#### *Choice of cattle and goat breeds*

Table 4 shows how farmers in Sandakan rank their preferred cattle and goat breeds. According to the study, 66.67% of farmers preferred Bali cattle, and 33.33% of farmers preferred Brahman cattle. On the other hand, in the case of goats, the major proportion of farmers (32.56%) preferred cross Boer, followed by Boer 23.26%, Kalahari 16.28%, Feral 11.63%, Cross Jamnapari 6.98%, Cross Katjang 6.98%, Saanen 2.31%. This study fingered that farmers in Malaysia mainly preferred meat-type breeds to dairy breeds.

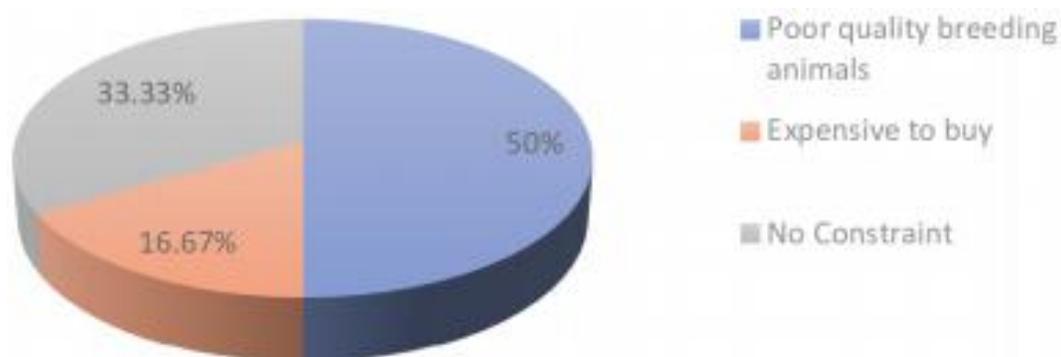


Figure 2. Constrains associated with breeding

**Table 3:** Types of breeding practices, breeding facilities followed by the farmer

Criteria	Species	Service Categories	Percent	Frequency
Type of Breeding practiced	Cattle and Goat	AI	0	0
		Natural	100	18
Distance	Cattle	Less than 1 Km	100	2
		1-3 Km	0	0
		More than 3 Km	0	0
	Goat	Less than 1 Km	100	16
		1-3 Km	0	0
		More than 3 Km	0	0
Useful life of breeding male	Cattle	Less than 5 years	0	0
		More than 5 years	100	2
	Goat	Less than 2 years	18.7	3
		More than 2 years	81.3	13

**Table 4:** Preferences of cattle and goat breeds at Sandakan in Malaysia

Types of Farm animals	Breeds	Reason	vote	Percent
Cattle	Bali	Good meat quality	2	66.67
	Brahman	High fat content	1	33.33
Goat	Cross Boer	Supply from DVS	14	32.56
		Fast growing		
		Govt. Scheme give Boer only		
		Resist to various disease		
	Cross Jamnapari	Good libido	3	6.98
		Horned		
		Popular		
	Kalahari	Good libido	7	16.28
		Big size		
		Fast growing		
Feral	Good meat quality	5	11.63	
	Adapt to environment			
Boer	fast growing	10	23.26	
	Big size			
	Adapt to environment			
Cross Katjang	Adapt to environment	3	6.98	
	More milk			
Saanen	More milk	1	2.31	

**Discussion**

*Involvement of Sandakan people with livestock rearing*

A survey was performed to determine the level of participation in the agricultural activity by the residents of Sandakan. A very small proportion of people (18%) was involved with livestock rearing. Livestock keeping does not seem to be widely practiced in this area. Malaysian agriculture sector

mainly characterized by plantation, oil palm mostly practiced. However, livestock production has received little attention. Furthermore, the government has put more focus on livestock production, citing the shared benefits of a livestock-oil palm integration scheme. As a result, people are gradually involved increasingly in the livestock production system.

### *Socio-economic attributes of the livestock owners*

The socio-economic approach focuses primarily on the social, economic, and political dimensions of people or social classes in the society (Adger, 1999). Various variables were selected for the assessment of the socio-economic profile, i.e. age, education, race, religion, family size, occupation. The survey proportion in terms of gender was 11 percent female and 89 percent male (Table 1). Relatively most of the respondents involved in livestock farming were men and only a few were female. This is due to the cultural heritage of the Malaysian people. The results were in conformity with the report of Melissa et al., 2016. This observation is also consistent with the findings of Bitende et al. (2001) and Chenyambuga et al. (2012), who stated that in agropastoral societies, men mostly household leaders, own livestock. There were few women who owned cattle and were the heads of the household and most of these were widows, divorced, or single women. It was found that 55.6% of respondents belonged to the young age group; 44.4% of respondents were in the old age group, with a mean age of 38.83 years (Table 1), inferring that both young and old people are engaged in livestock keeping although young people are more involved in this practice with the time course.

Several studies such as Vu (2012), Gul et al. (2009), Mugeru and Featherstone (2008) have shown that farmer education is important for improving production and performance. As a greater proportion of farmers is educated it would be easy going to convey technical information about livestock farming. A close look at Table 1 showed that 22.2 percent of respondents were without any form of formal education, whilst the number of respondents who joined primary school was 16.7 percent. The highest recorded academic accomplishment of farmers was 50% in secondary school education and very few had diploma level education (11.1%) (Table 1). In occupation, the mainstream (83.3%) of farmers reported being involved in agriculture (Table 1). This condition implying that households are fully-fledged agriculture-dependent, in addition, educational standards could have reduced options for other types of jobs.

### *Breeding practices*

It could be inferred from Table 2 that the pooled ratio of breeding males to females for cattle was 1:18 and for the goat was 1:30, respectively. A series of studies have been made to avoid inbreeding and to obtain an optimum male-to-female mating ratio. For cattle, a recommended ratio is one breeding bull to every ten breedable females (Terefe et al., 2012). Other findings also suggested the breeding males to female ratio 1:11.7 for Abigar cattle in Gambela region (Minuye, 2009), for Kereyou cattle 1:9.6 under pastoral

management conditions (Shiferaw, 2006). Therefore, our present findings pointing the insufficiency of breeding bulls which may lead to the chance of inbreeding. For small ruminants like goats, the recommended ratio is one buck to 25 does. Differently, Rao et al. 2009 reported that in India for Ganjam goat of Orissa they maintain breeding bucks to does ratio of 1:30 or 1:40. As a rule of thumb a 1: 20 ratio is adequate to ensure more than 95 percent herd fertility (Gebrelul, 2003). Consequently, the observation of the present study for the goat mating ratio is acceptable. Besides this, breeding males to female's ratio should be decided based on the management practices, age of the bull or buck, the condition and stamina of the male, his libido and the fertility level of the females, and other factors (Akpa et al., 2010; Tadesse et al., 2014).

All of the respondents surveyed in Sandakan reared cattle and goats under integration with tree crops system and all of the respondents (100%) were following natural service to breed their cattle and goat (Table 3). None of the respondents practiced controlled mating and breeding bulls, bucks with unknown pedigree allowed to mate with their relatives. This can be ascribed to the truth that there is a lack of a breeding program for the majority of farmers and a paucity of consciousness about the effect of inbreeding. While artificial insemination (AI) has gained widespread attention but natural service is still preferred because of high insemination cost, difficulty in heat detection, poor conception rate in case of AI adaptation. Further, breeding practices of livestock owners are impelled by multiple purposes of enhancing milk, utilization of local feed, diseases as well as accessibility and usefulness of breeding services in terms of successful conception (Murage et al., 2011). On the other hand, as constraints, half of the farmer's opinion that they are facing constraint associated with poor quality breeding bulls and buck and only 33% of the farmers they have no constraints at all in terms of breeding (Figure 2). Poor quality breeding bulls or bucks is associated with low libido, old age, and low fertility. In the cases of natural mating, unwanted mating is common where the presence of inferior quality breeding bull/buck in the herd may lead to an unsolicited problem on herd productivity.

Furthermore, the source/ service availability and how long the breeding males retained in the herd have been identified in the present study. Results revealed that 100% of cattle and goats had service availability within 1 km (Table 3). This fact attributed that all of the farmers used their own bull or buck for breeding purposes. In accordance with the results of the present study, Berhanu et al. (2012) reported that the major source of breeding bucks for agro-pastoralists and

pastoralists in their herd. Similarly, Chenyambuga and Lekule (2014) reported that livestock keepers in semi-arid and sub-humid areas in Tanzania practiced uncontrolled mating using bucks from either their own flock (66.7%) or neighbors' flocks (33.3%). Besides that, most of the farmers (100%) in Sandakan used their breeding bulls for more than five years whereas in goat, few farmers (18.7) keep breeding bucks in the herd for about less than two years and the majority of farmers (81.3%) used their breeding buck more than two years. According to scientific guidance, farm bulls and buck should be replaced every two years to prevent mating back to mothers or sisters in the herd (Flanders and Gilespie, 2015, Rashmi et al., 2014)). The combination of using breeding males from their own source and long-term utilization of the same breeding males may increase inbreeding in the population, resulting in long-term productivity losses due to herd genetic erosion. It is also pertinent that long-time use of the same breeding bull depreciates the capability of bull to mate an adequate number of females as well as the quality of semen (Tadesse et al., 2014; Mutenje et al., 2020).

#### Breed preferences

The majority of respondents in the Sandakan area claimed that their preferred cattle breed, known as Bali cattle, is endemic to Indonesia and can also be found in Malaysia, the Philippines, Hawaii, and Australia's Northern Territory. Bali cattle are well-known for their superior growth and reproductive capacities, despite living in harsh environments. Due to its high dressing percentage, it has often been regarded as a superior meat animal (Leo et al., 2012). Among those goat breeds found in Malaysia, the most popular breed among farmers in Sandakan was cross Boer due to its advantageous characteristics such as fast-growing, disease resistance, good libido, and horned. Another reason to choose this breed is that it is available through the government program which makes it easily accessible to the farmers. The origin of Boer goats in South Africa and they are recognized for excellent growth, fertility with a kidding rate exceeding 189%, meat quality, adapt to a wide variety of climatic and feeding environments (Ariff et al., 2010). However, due to a lack of dairy goat farms in Sandakan, the Saanen goat was the least common among farmers. Breed preference indices that populations in the Sandakan areas favor cattle and goat breeds for meat production over milk production. As a result of this situation, Malaysia's dairy industry is heavily reliant on imported milk and milk goods, and the intake of milk and milk products is also very poor.

#### Conclusion

It can be concluded that only a limited percentage of Malaysians are interested in livestock rearing, with the majority of them lacking effective breeding knowledge. The study's findings indicate that, in order to increase cattle and goat populations, scientific breeding strategies should be introduced, and that, in addition to relying on meat production, the government should also pay attention to other productive traits such as milk production.

#### Conflict of interests

There is no conflict of interest.

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