

Ethnotaxonomy of buffalo (*Bubalus Bubalis*) on livestock system of the Gayo Community, Aceh

Abdullah Akhyar Nasution¹, R. Hamdani Harahap², Suyitman³, Pawennari Hijjang⁴

¹ Universitas Malikussaleh; abdullah.akhyar@unimal.ac.id

² Universitas Sumatera Utara; r.hamdani@usu.ac.id

³ Universitas Andalas; suyitman@ansci.unand.ac.id

⁴ Universitas Hasanuddin; pawennari@unhas.ac.id

* Correspondence author: abdullah.akhyar@unimal.ac.id

ARTICLE INFO

Keywords:

Ethnoscience; Traditional Livestock; Ethnotaxonomi; Aceh.

How to cite:

Nasution, A.A., Harahap, R.H., Suyitman, Hijjang, P. (2023). *Ethnotaxonomy of buffalo (Bubalus Bubalis) on livestock system of the Gayo Community, Aceh.* ETNOSIA: Jurnal Etnografi Indonesia. 8(2): 257 – 270.

DOI:

10.31947/etnosia.v8i2.26099

ABSTRACT

This paper aims to reveal the knowledge of the Gayo community about buffalo ethnotaxonomy so as to provide a good alternative for sustainability issues in maintaining local wisdom and identity. This research was conducted in Gayo Lues Regency using a qualitative approach because the main purpose of this study was to explore the knowledge and understanding of the Gayo community based on the emic perspective of the community regarding the classification of buffalo species. The data collection techniques used participatory observation, in-depth interviews, FGDs and document studies. The results showed that the knowledge of the Gayo community regarding the genetic ethnotaxonomy of buffalo can be seen from their ability to classify livestock types based on gender, skin color and horn shape owned by buffalo. There are six types of horns identified, namely: Caweng / Gaweng, Gonok, Gampang, Durung / Cakah, Rukup, Rebah, and Gope / Gupik. As for skin color, there are four categories, namely segem, jeged, impil-impil and sawak. The shape and characteristics possessed are indicators in determining the quality of the buffalo because it is correlated with the ability to endure, have energy and the quality of the meat produced. Knowledge of this matter is very useful for parties with an interest in the world of livestock to be used as a basis for policy making.

1. Introduction

Indonesia is one of the countries whose people have the potential to face problems in the availability and access of food, both carbohydrate food and protein food. Research results from the Indonesian Institute of Sciences in 2017 revealed that Indonesia has the

potential to experience a food crisis in 2025 due to several things, including; high costs of agricultural production, declining interest of the younger generation to become farmers and the complexity of governance and distribution of agricultural products (Indopos, 2017). In addition, food insecurity is also triggered by environmental quality degradation which results in the loss of local genetic resources. In a release, UGM (by Gusti, 2018) stated that Indonesia has lost 75% of agricultural genetic resources. Regarding livestock genetic resources, FAO (by Kurnianto, 2018) stated that at least 20% of the 7,616 breeds recorded in the global databank for animal genetic resources (Global Databank for Animal Genetic Resources) fall into the "risk" condition category. This fact shows that the availability of food in various forms is influenced by many things, including regulation and appreciation of the diversity of genetic resources.

In the last few decades, Indonesia has also experienced problems in terms of fulfilling animal protein foods. Therefore, conducting a study on the issue of the condition of local genetic resources is crucial and important. The Gayo buffalo clump is one of the many local genetic resources. Recognition of this can be seen from the Decree of the Minister of Agriculture of the Republic of Indonesia number 302/Kpts/SR.120/5/2017.

Culturally, buffalo has an important position in the life of the Gayo community. Even though there has been a change at the level of the action and material system, at the idea system level, the value of the buffalo has not changed significantly (Nasution, et.al, 2020). The condition and existence of local genetic resources, both in the form of plants and animals, are basically greatly influenced by government regulations and community treatment. If the government or related parties are not paying attention, it can be ascertained that the local genetic resources of livestock are under threat, both in terms of quantity and quality. Even at the most extreme levels can experience extinction. On the other hand, if there is a pro-breeder policy and farmer awareness to maintain it, then the existence of native or local livestock will be protected (Kurnianto, 2018).

The practice of raising buffalo has actually been carried out by the gayo community for hundreds of years, so that by itself a set of values, behaviors and materials related to buffalo-breeding activities has been developed. In terms of values, the Gayo community is believed to have gathered a variety of collective experiences of raising buffalo into a set of knowledge as part of local wisdom. Therefore, the knowledge of the Gayo community about the various classifications of buffalo species is feasible to be explored. This is useful to find out how the gayo community emic views about the type of buffalo that has benefits according to their needs. In general, the classification system of flora and fauna owned by each ethnic group is known as ethnotaxonomy. In the study of natural sciences, the existence of community wisdom, including local knowledge, has become very important in recent years (Mourão, Araujo & Almeida, 2006).

From generation to generation, the community's local wisdom has been proven to have adaptability in supporting the life of the community that owns it in anticipating threats to environmental change (Arafah and Maruf, 2015). This condition becomes the basic idea of the stretcher thought by Stevenhagen (1986) which is summarized in the Ethnodevelopmentalist. In general, the basic idea of developmentalism emphasizes that ethnic-based development is carried out through 4 stages, namely; (1) Territorialism; development based on regional potential with local ethnic distribution; (2) Internal self;

efforts to identify ethnic capabilities in controlling their destiny in the context of the nation state; (3) cultural pluralism; there must be existence and understanding of the existence of cultural differences in society; and (4) economic sustainability; development must ensure that no environmental damage occurs. In connection with the utilization of community wisdom in this case local knowledge in supporting development in the blood related to the livestock system, the effort to identify the existence of buffalo ethnotaxonomy is important to study.

2. Method

This research was carried out in Gayo Lues Regency, Aceh Province with the material object is a livestock system that is run in the culture of the Gayo Lues community. There are several motivations and arguments of the author why this research takes the focus in the Gayo Lues area, including: 1) Buffaloes are one of the Gayo identities, apart from coffee and horse commodities; 2) The buffalo farming system has long been found in this area, even in ancient times all the villages inhabited by the Gayo people had a livestock system; and 3) The Government of Gayo Lues Regency has declared the livestock sector as the leading sector so that many programs related to livestock will be carried out by the government.

This study uses a qualitative approach, where the main purpose of this study is to explore the knowledge and understanding of the Gayo community based on the emic perspective of the community related to the classification of buffalo species contained in the pattern of animal husbandry practices that have been carried out so far. To obtain field data, the author uses several techniques, namely: Participation Observation, In-depth Interview, and Focus Group Discussion (FGD).

Referring to Marshall and Rossman (1989), observation is defined as "*the systematic description of events, behaviors, and artifacts in the social setting chosen for study*". buffalo from a "*native point of view*" perspective. Second, In-depth Interviews. Spradley in one of his books explains that interviews are part of "*field work*" with the main tasks:

"This means asking questions, eating strange foods, learning a new language, watching ceremonies, taking field notes, washing clothes, writing letters liome, tracing out genealogies, observing play, interviewing informants, and hundreds of other things. This vast range of activities often obscures the most fundamental task of all field work – doing ethnograph" (Spradley, 1979).

Through observation, various actions and treatments will be obtained in the community related to buffalo farming patterns. Meanwhile, by conducting in-depth interviews, cognitive arguments will be obtained for the variety of treatments and/or experiences possessed by the informants regarding the farming patterns practiced. In this study, this participatory observation technique helps to obtain data on how the Gayo community reflects their values related to buffalo farming expressed through a series of actions and material systems that are present using their point of view (emic view). Moreover, the participation observation technique also has various excellent indicators in completing research. As stated by Schensul and LeCompte (1999) that the most logical reason for the use of this participatory observation technique is in addition to being in line with the output of the research objectives to be achieved, also because participatory observation

is used including to (1) identify and guide/direct relationships with informants and (2) Assist researchers in understanding how things are organized and prioritized, how people relate to each other, and what cultural parameters apply.

The use of in-depth interview techniques in this study aims to reveal what is in the head/point of view of the Gayo community regarding the virtues of buffalo and the various experiences of why buffalo farming is carried out. In addition, the in-depth interview process also aims to obtain data and information related to the knowledge of the Gayo community about the various forms and values contained in various local wisdoms. So that the research rhythm becomes valid and unbiased. While in the field, the researcher was able to interview basic informants, key informants/key informants, and general/supporting informants.

The next data collection technique is Focuss Group Discussion (FGD). This technique is used aimed at developing and sharpening field data found previously. And the last is document study. Government publications, ancient photo documents, map archives and data on regional boundaries related to this research are only a few of the forms of documents studied in this research.

All data obtained were analyzed using the stages of ethnographic data analysis popularized by Spradley (1979). Although modifications have been made at several stages, the data analysis carried out by the anthropologist has become a reference in this study. At this stage, the data analysis process also uses the "on going analysis" model.

3. Result and Discussion

- Buffalo/Koro Ethnotaxonomy in Gayo Society base on Horn Type

Biologically, the Gayo Buffalo is a mud buffalo (*Bubalus Bubalis*) with 48 pairs of chromosomes. In accordance with its characteristics, the gayo buffalo is a type of buffalo with a calm temperament, docile, resistant to critical food and water conditions, and resistant to parasites (ticks and worms). In other words, the Gayo buffalo is a type of buffalo that has excellent adaptability in critical environments. In addition, this type of buffalo is a type of livestock that has strong energy, which is characterized by the ability to walk long distances and a group lifestyle.

In line with biological knowledge classifying animal species according to certain criteria, it is also necessary to look at how the Gayo ethnic group classifies buffalo/koro according to their cultural knowledge. Emically the Gayo people also build an ethnotaxonomy of buffalo/koro based on the shape of the horns. The results of interviews and observations show that the ethnotaxonomy of buffalo/koro according to the type of horn in the Gayo community in Gayo Lues Regency is as follows:

1. Buffalo/*Koro Cawing/Gaweng*

Buffalo/*Cawing buffalo/Gaweng* is a type of buffalo that has one horn towering up and one towering down. Even though the *Cawing/Gaweng* buffalo is dominated by the female sex, it does not mean that there are no male *Cawing/Gaweng* buffaloes. It's just

that the frequency of male buffalo with the Cawing / Gaweng horn model is indeed very difficult to find.



Figure 1. Buffalo with Cawing Horns

2. Buffalo / Koro Gonok

Buffalo/Koro Gonok is a type of buffalo with both horns pointing downwards and sometimes pointing backwards in an inverted model. This buffalo is rarely found male. If there is a male sex then the price will be very high. This type of buffalo is dominated by the female sex.



Figure 2. Gonok Buffalo (Horns pointing downwards & backwards in reverse)

Another interesting thing about the buffalo/ Gonok buffalo is that sometimes horns are found which indicate that it is not rooted. The horns can sway so that it looks like the horns are just dangling. If the buffalo/koro shakes his head for some reason, then there are times when the tips of the horns pointing down touch each other/ crash/ collide with each other, causing a loud sound.

3. Buffalo/Koro Gampang

Buffalo / Koro Gampang is a buffalo that has a horn shape pointing upwards with the position of the horn growing wide. However, the ends of the horns point upwards perpendicularly. Easy buffalo species, although rare, are often found among members of a buffalo herd. Gampang buffalo is not specifically dominated by buffalo of a certain

sex. According to the breeder/maintenance of the population for buffalo with horns like this, the male and female sexes can be compared 50:50. The interesting thing is that buffalo with horns of this type are often found in jet black buffalo (Segem), although sometimes in impil-impil color buffaloes can also be found.



Picture 3. Gampang Buffaloes take shelter in the cottage in Uwer

4. Buffalo/Koro Cakah/Durung

This type of buffalo/Koro is a buffalo/koro whose two horns point upwards but the ends of the horns do not stretch inward. The tips of the horns of this type of buffalo tend to be up and wide while still pointing upwards. This type of buffalo/koro is found to be female. Only a small proportion of this type of buffalo/koro are male

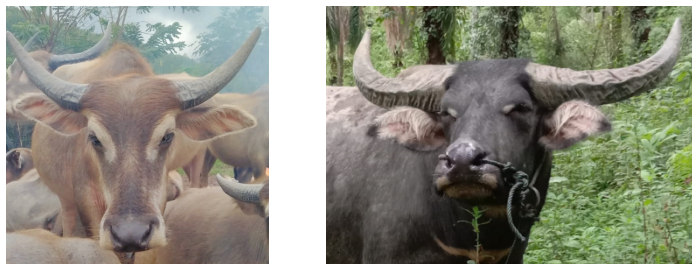


Figure 4. Gampang Buffaloes take shelter in a hut in Uwer

5. Buffalo / Koro Rukup

This type of buffalo/koro is all buffalo/koro whose two horns grow backwards. In addition, the growth of the horns is curved and it is as if the tips of the horns will meet at one point later. By breeders / keepers it is believed that male buffalo with this type of horn will often win the battle with other males. This is because with horns like this one can easily injure other buffalo while fighting.



Figure 5. Buffalo/ Rakup Koro kneeling

6. Buffalo/Rebah Koro

In contrast to other buffalo/koro, this type of buffalo/koro has horns that are not curved but display sideways. The position of the horns grows horizontally and extends to the right and left sides proportionally. This type of buffalo / koro is dominated by female buffalo. It is very rare for a male buffalo to be found with this type of horn



Figure 6. Buffalo/Female Koro in Rebah species with its child

7. Buffalo / Koro Gupik / Gope

While the previous seven buffalo/koro had various types of horns, this Gupik/Gope buffalo/koro is a type of buffalo/koro without horns. At first glance this type of buffalo/koro tends to look hornless or at first glance it looks like a horned buffalo. This buffalo is very rarely found in the middle of a herd of buffalo.

In simple terms, the ethnotaxonomy of buffalo/koro in the Gayo community, including in Gayo Lues, seen based on the horns they have can be simplified in the following figure:

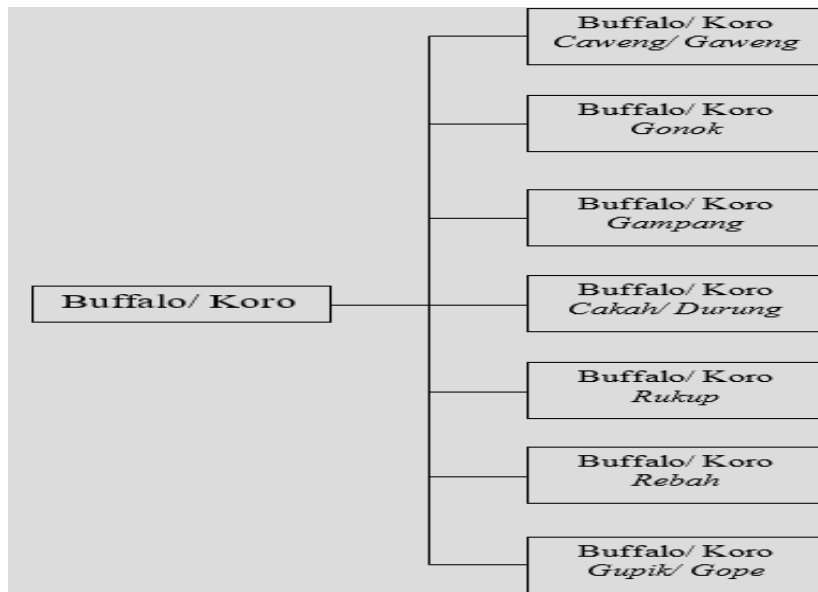


Figure 7. Ethnotaxonomy of Buffalo/Koro According to Horn Shape

- **Classification Buffalo Based on Skin Color**

Except the shape of the horns, the Gayo community also has a buffalo/koro ethnotaxonomy based on skin color. If the type of horn does not affect the growth and development of meat, then the case is different with the type of buffalo based on the skin. Skin type plays an important role in classifying which buffaloes are suitable to be kept as meat and which are not. In simple terms, the ethnotaxonomy of buffalo/koro by breeders/keepers based on skin color can be seen in the following chart:

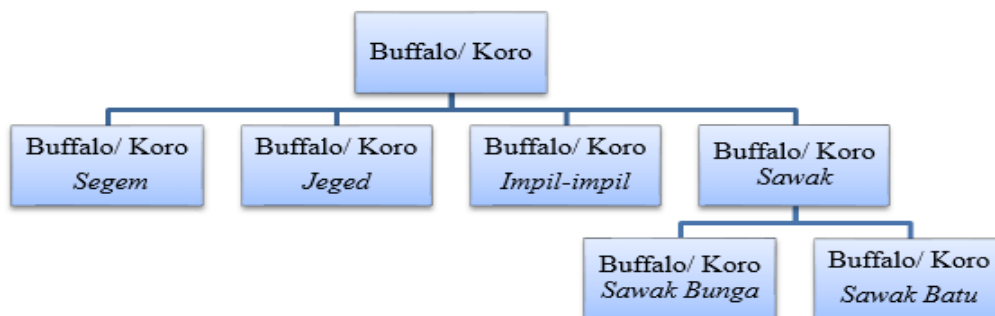


Figure 8. Ethnotaxonomy of Buffalo/Koro According to Skin Color

More specifically, the combination of skin color with certain types of horns is believed by breeders/keepers as superior individuals from livestock. Based on the results of field research, it is known that the distribution of buffalo/koro species in the Gayo community based on skin color is as follows:

1. Buffalo/*Koro Segem*

Segem is a type of buffalo / Koro which has a dark black / jet black skin color. Breeders believe that this type of buffalo has a strong physique and strong energy. The posture of this type of buffalo is usually larger with a bone structure that looks solid. The large posture causes this type of buffalo/koro to be believed to have more meat. Long ago, buffalo/koro Segem with Gampang horns and Durung/Cakah were considered the best individuals because apart from their large stature, the strength and shape of their horns were believed to have advantages if they were used as working animals, either as animals to pull blocks in the forest (Knok/Nok) or as pullers in the fields. Meanwhile, buffalo/koro Segem with other types of horns are believed to only have more meat potential because if they are brought to work, the horns are physically unsupported.



Figure 9. Buffalo/ Segem Buffalo in Rice Field

According to the ethnotaxonomy of the Gayo community, buffalo/koro with jet black skin, according to their experience, also affects the weight of a buffalo. This type of segem skin if sorted from several other skin types, this type gets the first rank in terms of meat weight, with a comparison at the same age. The comparison between this type of buffalo leather with other types of skin such as Jeged can reach 10 kg heavier. Therefore, if it is specifically for obtaining meat, then this type of buffalo is recommended for breeding.

2. Buffalo / *Koro Jeged*

This type of buffalo/koro is a buffalo/koro that has a slightly reddish white skin color. Emically, the residents also divide the buffalo/koro Jeged into two major parts, namely Jeged with white eyes and Kerabu/Koro Jeged with black/ordinary eyes. Local people believe that the jeged buffalo with white eyes is an albino buffalo. That is, a genetic mutation has caused the buffalo to have a reddish-white skin color. Meanwhile, the buffalo/koro Jeged with black/ordinary eyes is a type of buffalo that does have an innate nature of white and reddish skin color. Breeders believe that this type of buffalo does not have the same meat potential as buffalo/koro Segem. Even to be used for work, this type of buffalo is considered not to have strong strength and physical strength. The combination of buffalo / koro Jeged with horns by breeders / breeders is believed to be nothing specific. One of the advantages of this buffalo is that sometimes the color of the horns is also brightly colored like ivory (yellow-brown or sometimes yellow with black patterns).



Figure 10. Buffalo/ Segem Buffalo in Rice Field

According to the breeder, buffalo with Jeged skin type is a buffalo that has the lightest meat weight compared to buffalo with other skin colors. If sorted, the buffalo with this jeged skin type gets the last rank for the problem of meat weight. However, one of the advantages of buffalo with this type of skin is the high selling value for ordering traditional events. Not because of the meat, but because of the color of the skin and fur. Some areas in Indonesia sacred buffalo with this type of jeged skin. However, this type of buffalo will be priced cheaply if it is only used for meat and retailed to the public.

3. Buffalo / *Koro Impil-impil*

This buffalo/Koro is black or gray in color and covered with white or brownish red hairs. This buffalo/Koro also has a very good growth and is close to the growth of the Segem buffalo. Therefore, this type of buffalo/koro is also very popular.



Figure 11. Buffalo/ Buffalo type Impil-Impil

Impil-impil is one type of buffalo that is good for breeding and obtaining meat. This is because this buffalo is one of the buffalo with black skin so it has faster meat growth. If sorted from several types of buffalo based on skin, then buffalo with this type of impil skin can occupy the second position.

4. Buffalo / Koro Sawak

Buffalo/ Sawak buffalo is a buffalo which have black and grayish skin color but in some parts of the body they also have white skin color. According to the distribution of the white skin color they have, the Buffalo/Sawak buffalo are further classified into two, namely:

a. Buffalo / Koro Sawak Bunga

This buffalo is black, but its eyes are surrounded by white. The results of the production of meat produced by this buffalo is very moderate. For this type of sawak bunga itself has only moderate growth of flesh. No better than segem and impil. Nor is it worse than jaged. If it is sorted, then it can be positioned on the third sequence number.



Figure 12. Buffalo / Koro Sawak Bunga Type

b. Buffalo / Koro Sawak Batu

This type of buffalo has a dominant color of black, but some parts of the body other than the face/face also have white color. Other white colors are usually found on the inside of the forelegs, hind legs and lower abdomen. This buffalo is also the same as sawak bunga in the development of meat production



Figure 13. Buffalo/Koro Species Sawak Batu

- **Discussion**

Ethnotaxonomy data analysis related to the genetics of Gayo buffalo is important to reproduce as part of the collective intelligence of the Gayo community in buffalo farming. This knowledge becomes the basis of guidance as a foothold in seeing and determining the quality of buffalo based on the functions and benefits to be obtained from the business of raising buffalo based on the emic view of the Gayo community. There are three basic indicators that become criteria in determining the quality of a buffalo, namely resistance to various diseases and weather, energy that can be utilized, and quantity and quality of meat produced.

Table 1. Matrix of Horn Type and Skin Color of Buffalo/Koro associated with Livestock Function

Buffalo/ Koro Horn Shapes and Skin Color	Segem			Jeged			Impil-impil			Sawak		
	Enduranc e	Energy	Meat	Enduranc e	Energy	Meat	Enduranc e	Energy	Meat	Enduranc e	Energy	Meat
Caweng/ Gaweng	+++ +	+++	+++ +	++ +	++	+	+++ +	+++	+++	+++ +	++	++
Gonok	+++	+++	+++ +	++ +	++	+	+++ +	++	+++	+++ +	++	++
Gampang	+++ +	+++ +	+++ +	++ +	++	+	+++ +	+++ +	+++	+++ +	+++ +	++
Durung/ Cakah	+++ +	+++ +	+++ +	++ +	++	+	+++ +	+++ +	+++	+++ +	+++ +	++
Rukup	+++ +	+++ +	+++ +	++ +	++	+	+++ +	+++ +	+++	+++ +	+++ +	++
Rebah	+++ +	+++	+++ +	++ +	++	+	+++ +	++	+++	+++ +	+++	++
Gope/ Gupik	+++ +	++	+++ +	++ +	++	+	+++ +	++	+++	+++ +	++	++

Source: Research Analysis, 2022

Note:

+ = Less Good/Minim

++ = Good

+++ = Good Enough

++++ = Very Good

Based on the matrix above, there are some important information and knowledge related to the ethnotaxonomy of the Gayo buffalo, namely:

First, buffalo with the same skin color and *gampang* horn shape, *durung/cakah*, and *rukup* have good endurance, energy, and meat production. This is the best choice for any form of function to be achieved. Both to utilize their energy and for the production of meat. Second, the general endurance of the Gayo buffalo can be said to be very good. Field data show that only buffalo with *segem* skin and horns in the shape of a *gonok* have "good enough" resistance.

Second, if the preference of the breeder is to utilize energy, be it for plows or transportation equipment, then the buffaloes that are chosen are those with *segem* skin, *impil-impil* skinned and *sawak* skinned, all of which are in the form of *gampang* horns, *durung/cakah*, and *rukup*. Meanwhile, the buffalo which is *segem* in color and has *gope/gupik* horns has a "good" level of energy. In addition, *jeged*-skinned buffalo is not a good choice if it is used for energy utilization. The same goes for the *impil-impil* colored buffalo with *gonok* horns, lying down and *gope/gupik*. *Sawak*-colored buffalo with *caweng/gaweng*, *gonok* and *gope/gupik* horns are the same, buffalo with this classification have less energy.

Third, if the interest of livestock farmers is for maximum meat production, then the right buffalo to be an alternative is the *segem* skin color with various forms of horns. Meanwhile, the black-skinned buffalo has very minimal/unfavorable meat production. Buffaloes with *impil-impil* skin have meat production at a "good enough" level. while buffalo with *sawak* skin, is not the right choice if it is intended for meat production.

4. Conclusion

The knowledge of the Gayo community regarding the genetic ethnotaxonomy of buffalo can be seen from their ability to classify livestock types based on sex, skin color and horn shape owned by buffalo. There are six types of horns identified, namely: Caweng / Gaweng, Gonok, Gampang, Durung / Cakah, Rukup, Rebah, and Gope / Gupik. As for skin color, there are four types that can be identified, namely segem, jeged, impil-impil and sawak. Each of these forms characterizes the qualities and advantages they have, both in terms of durability, strength and the quality of the meat produced.

This ethnotaxonomy capability is very useful for policy makers involved in the gayo buffalo conservation project with all the wisdom they have. This knowledge can be used as the basis for determining local genetic superior seeds to be preserved so that there is special attention for buffalo that have certain characteristics. In addition, the color of the skin and the type of horn owned by a buffalo are also positively correlated with economic value that brings prosperity. Of course, further studies in a wider scope need to be carried out so that knowledge about the ethnotaxonomy of local buffalo can always be reproduced. For example, by conducting a comparative study of how the development of the Gayo buffalo (endurance, energy, and meat production) has been brought out of the Gayo area.

In order to ascertain whether this local knowledge has relevance to the potential for meat and other products from livestock, it is necessary to conduct a study using a livestock biology approach. Thus the use of local wisdom in the form of traditional knowledge will be able to confirm its usefulness.

Conflicts of Interest: The writing team declares that there is no conflict of interest in the writing of this article

References

- Gusti, "Indonesia Kehilangan 75% Keanekaragaman Sumberdaya Genetik Tanaman Pertanian", Berita dipublish pada <http://www.ugm.ac.id/id/berita/16887-indonesia-kehilangan-75-keanekaragaman-sumberdaya-genetik-tanaman-pertanian>, (2018).
- Indopos, "Krisis Pangan Ancam Indonesia", Berita pada edisi 22 September 2017, (2017), pp. 1&7.
- Mourao, J.S., H.F. & Almeida, F.S, "Etnotaxonomy of Mastofauna as Practised by Hunters of the Municipality of Paulista, State of Paraiba-Brazil", Journal Ethnobiology Ethnomedicine., 19 February (2006).
- Nasution, "Identifikasi Stakeholder dan Analisis Aktor Serta Kelembagaan Terkait Isu Publik Pengembangan Kawasan Peternakan Kerbau Berbasis Kearifan Lokal di Gayo Lues", Aceh Anthropological Journal., Vol (4) No. (2) (2020).
- Marshall, Catherine & Rossman, Gretchen B., "Designing qualitative research", Newbr Park, CA: Sage, (1989).
- Schensul, Stephen L.; Jean J. & LeCompte, Margaret D., "Essential Ethhnographic methods; observations, interviews, and questionnaires", Walnut Creek, CA: AltaMira Press, (1999).
- Spradley J. P., "The Ethnographic Interview, New York: Holt, Rinehart and Winston,, Inc, (1979).

- Kurnianto, E., "Sumber Daya Genetik Ternak Lkal", Prosiding Seminar Teknologi Agribisnis Peternakan (Stap) Fakultas Peternakan Universitas Jenderal Sudirman, Indonesia, 23 Mei (2018)
- Stavenhhagen, Rodolfo, "Ethnodevelopment A Neglected Dimension in Development Thinking in Development Studies: Critique and Renewal by R. Aphtorpe; A. Krahl (Eds) Leiden: E.J. Brill also published on Pioneer on Indigenous Right, SperingBriefs On Pioneers in Science and Practice. DOI: 10.1007/978-3-642-34150-2_2, (1986).
- Arafah, Nur dan Amar Ma'ruf. The Adaptation of Local Wisdom as a Solution to Environmental Conservation in Small Islands. Artikel pada Proceeding of the Celebes International Confrence on Diversity in Wallacea's Line (CICDWL). Kendari, 8-10 Mei (2015)