

# Potential Development of Local Animal Genetic Resources in Maluku

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## Abstract

Maluku has been well known as an archipelagic province consisting of small islands which are rich in natural resources such as exotic animals. Moa buffalo, Lakor goat, and Kisar sheep are local genetic resources of livestock from Maluku which have been endorsed by the Ministry of Agriculture of the Republic of Indonesia to be protected, conserved, and sustainably utilized for human welfare purposes. These three species have been a part of the local people life as food, income, savings, and organic fertilizer sources. Formulation of the Grand Design for the development of these species was completed in 2013, which includes some strategic policies for the development. Real follow-up actions in forms of research should be designed covering various aspects to accelerate the achievement of the development of these potential local livestock. The research aspects that should be considered are local human resource capacity strengthening, genetic quality improvement, animal feedstock development including local forage and pasture quality improvement, animal diseases control, animal waste-based bioenergy development, product and post-harvesting handling, and policy and regulation aspects.

**Keywords:** Kisar sheep, Lakor goat, Moa buffalo

## Introduction

Maluku Province, Indonesia, as an archipelagic province, which consists of small islands, has specific local genetic resources of livestock, namely Moa buffalo, Lakor goat, and Kisar sheep. Moa buffalo, Lakor goat, and Kisar sheep can be found in Moa, Lakor, and Kisar islands, respectively. Those livestock have been existed and survived for generations, so that they have accustomed to specific characteristics possessed only by these livestock.

In 2011, Moa buffalo, Lakor goat, and Kisar sheep have been endorsed by the Ministry of Agriculture of the Republic of Indonesia, as native Indonesian livestock from Maluku.

As the matter of fact, these local livestock have excellent characters that are able to survive on low quality of feed, able to live on pressure of climate, and high endurance to local parasites and diseases. Therefore, these livestock are a good source of special genes that can

be used for breeding livestock to increase production on low cost, to support food variety, agriculture, and culture, and to achieve the aim of local food security (FAO 2002).

Academic researches on Moa buffalo, Lakor goat, and Kisar sheep, such as livestock characterization, evaluation on potential of feed source and farmer potency, and socio-economy analysis, have been done. Special examine in formulating “Grand Design”, of development of these three commodities has also been done. In the “Grand Design” document, the development of these livestock aimed to be done on the basis of local resources, based on characteristics of the local area, and it has been formulated in development strategies and policies. In the development strategies and policies, more researches need to be continued in order to achieve targets stated in the “Grand Design” document. Real follow-up actions in forms of research should be designed covering various aspects to accelerate the achievement of the development of these local livestock’s potential. Research aspects that should be considered are local human resource capacity strengthening, genetic quality improvement, animal feedstock development including local forage and pasture quality improvement, animal diseases control, animal waste-based bioenergy development, product and post-harvesting handling, and policy and regulation aspects.

Therefore, collaborating research need to be designed in developing Moa buffalo, Lakor goat, and Kisar sheep to support local people welfare.

### **Morphological Characteristics of Moa Buffalo, Lakor Goat, and Kisar Sheep**

Moa buffalo is a swamp buffalo, which has twisted neck by black line “*chevron*”. Morphological characteristics of Moa buffalo based on characterization on 174 Moa buffalo is shown in Table 1. Color of body is one of the most specific characters of animal breeding. It can be seen from Table 1 that color of the buffalo vary from black (46.67%), followed by grey (28.74%), white (15.52%), and combination of these three colors (black, white, and grey) (12.07%). Combination of black and white color of Moa buffalo is similar to Bonga buffalo in Toraja. Bonga buffalo can be found in TO Bada, Central Sulawesi, Sumba, Flores, Roti, and Timor (NOOY-PALM 1979) and it is very expensive up to hundreds million rupiah. Variation in the color of Moa buffalo body is different with swamp buffalo in Kalimantan which states by LENDHANIE (2005), in which those in Kalimantan are brown-grey.

Lakor goat is cross-breed between Etawah goat descendent and Kacang goat (Indonesian native goat), in which genetically Etawah is dominant. A specific character of Lakor goat is color of hair which varies from white, black, brown, grey, crème, and combination of those five colors. Characteristic of Etawah goat which still exists is drooping long ear. Morphological characteristics of Lakor goat is shown in Table 2.

Table 1. Morphological characteristics of Moa buffalo.

Parameter	Character / Percentage (%)
Face line	Strairght
Horn	Presence
Position of horn	Arch-shaped (curve from side to back-side)
Position of ear	Straight to the side
Back-line	Concave (bowl-shaped)
Color of head	Grey (40.80), black (44.25), and white (14.94)
Color of body skin	Grey (28.74), dominant grey, combine with white (2.30), black (43.67), dominant black combine with white (6,32), white (15.52), dominant white combine with grey (1.15), dominant white combine with balck (2.30)
Pattern of skin color	Big pock-mark (9.20), small pock-mark (0.57), speckle (4.02), and smooth (86.21)
Color of toe-nail	Grey (0.57), brown (0.57), black (55.75), white (24.71), combination of black and white (18.39)

Source: SALAMENA *et al.* (2009).

Table 2. Morphological characteristics of Lakor goat.

Parameter	Characteristics
Horn	Presence, small, grow up, and curve to the back
Ear	Long and dropping
Color of hair	White, black, brown, grey, crème, and combination of these five colors

Source: BERHITU (2004).

The measurement of 273 sheep on Kisar island indicates that Kisar sheep is Ekor Gemuk sheep, in which male has horn, while female does not have. A specific character of Kisar sheep is color and motif of body hair color. Hair color is dominated by white-black (55.41%), white (30.30%), and black-white (10.39%). Motif of body hair color varies from small pock-mark (40.26%), plain (28.41%), big pock-mark (21.21%), and speckle 10.39 %). Morphological characteristic of Kisar Sheep is shown in Table 3.

### **Production and Reproduction of Moa Buffalo, Lakor Goat, and Kisar Sheep**

Live weight is one of the production indicators of meat producing animal. Live weight of Moa buffalo, Lakor goat, and Kisar sheep is shown in Table 4. Average live weight of Moa buffalo aged 3-4 years is 228.4 kg for male and 215.68 kg for female. Average live weight of

Lakor goat aged 2-3 years is 70.43 kg and 40.98 kg for male and female, respectively. Meanwhile, average live weight of Kisar sheep aged 2-3 years is 25.82 kg for male and 18.87 kg for female.

Live weight of those animals has decreased dramatically due to two factors. Firstly, farmers tend to sell big and heavy animals, associated with high price, so they will receive enough money to meet their need. Secondly, traditional system in raising animals leads to decreasing in production and live weight.

Reproduction is an important factor which needs to be considered because more efficient reproductive characters will result in increasing population of animals in an area. Reproductive characteristics of Moa Buffalo, Lakor Goat, and Kisar Sheep can be seen in Table 5.

Table 3. Morphological characteristics of Kisar sheep.

Parameter	Proportion (%)
Concave face line	99.13
Presence of horn :	
- Male	100.00
- Female	0.00
- Twisted horn on male	100.00
Ear, downward	97.84
Color of face hair :	
- Black	40.26
- Combination of black and white	33.77
- Combination of white and black	23.38
Color of ear hair:	
- Solid black	52.81
- Solid white	23.38
- Combination of black and white	13.42
- Combination of white and black	10.39
Color of body hair:	
- Black and white (dominant white)	55.41
- Solid white	30.3
- White and black (dominant black)	10.39
- Solid black	0.43
- Brown and black (dominant	0.43
Pattern of body hair color:	
- Small pock-mark	40.26
- Plain	28.14
- Big pock-mark	21.21
- Spotted	10.39

Source: SALAMENA (2006).

Table 4. Live weight of Moa buffalo, Lakor goat, and Kisar sheep.

Livestock	Average live weight (kg) ( $x \pm s$ )				
	< 1 year	1 – 2 year	2 - 3 year	3 - 4 year	4 - 5 year
Male					
Moa buffalo	-	79.80 $\pm$ 82.70	186.10 $\pm$ 34.16	228.40 $\pm$ 51.30	288.20 $\pm$ 49.10
Lakor goat	-	59.17 $\pm$ 3.10	70.43 $\pm$ 2.20	80.59 $\pm$ 1.80	-
Kisar sheep	13.69 $\pm$ 2.11	19.00 $\pm$ 3.45	25.82 $\pm$ 4.75	29.43 $\pm$ 6.69	27.71 $\pm$ 8.18
Female					
Moa buffalo	-	119.50 $\pm$ 68.30	171.20 $\pm$ 67.20	215.68 $\pm$ 30.89	279.70 $\pm$ 45.20
Lakor goat	-	34.43 $\pm$ 6.44	40.98 $\pm$ 1.30	46.64 $\pm$ 1.30	-
Kisar sheep	13.44 $\pm$ 2.50	20.66 $\pm$ 1.88	18.87 $\pm$ 2.49	21.74 $\pm$ 4.53	19.50 $\pm$ 6.33

Source: BERHITU (2004), SALAMENA (2006), and SALAMENA *et al.* (2009).

Table 5. Reproductive characteristics of Moa buffalo, Lakor goat, and Kisar sheep.

Parameter	Moa buffalo	Lakor goat	Kisar sheep
The onset of puberty (month)	25 - 37	6 - 8	6 - 8
Estrous cycle (day)	21 - 23	18 - 21	14 - 19
Length of estrous cycle (day)	1 - 3	1 - 2	1 - 2
Gestation length (month)	9 - 10	5	5
Rate of conception (%)	78.92	100.00	86.36
Age at first calving	41 – 49	11 - 13	15 - 17
Calving interval (month)	19 - 21	8 - 9	8 - 9
Calving rate (%)	55.95	160.00	102.58
Post partum interval (month)	9 - 11	3 - 4	2.5 - 4
Mortality rate (%)	11.23	12.00	21.18
Survival rate of mature animal (%)	88.52	88.00	78.82
Length of raising (year)	11 - 13	5 - 8	5 - 8
Length of life (year)	18 - 20	10 - 12	10 - 12
Reproductive efficiency of female	70.91	-	-
Weaning (month)	8 - 10	3 - 4	3 - 4
Type of birth	Single	Twin	Single

Source: MANUPUTTY (2004) and SIWA (2007).

### **The Use of Local Animal Genetic Resources: Moa Buffalo, Lakor Goat, and Kisar Sheep**

Moa buffalo, Lakor goat, and Kisar sheep have been a part of live of farmers in Moa, Lakor, and Kisar islands.

In Moa, buffalo has been used as ritual animal for traditional ritual, wedding-present, and

fine. It is also has been consumed in both fresh and dried meat which preserved in traditional ways (smoked and dried under the sun). In calving season, milk is consumed in limited amount, both fresh and preserved. Milk is preserved with sap of jawi-jawi tree (local name: *aylieru*) (SALAMENA *et al.* 2009). Moa buffalo is also source of income and live savings which can be sold anytime to meet farmers need. Selling price of mature male of buffalo, weight approximately 300-400 kg on farmer level, is 7-9 million rupiah. Manure of the buffalo has been used as organic fertilizers by small number of farmers in limited volume.

In contrast to Moa buffalo and Kisar sheep, Lakor goat is mainly used as source of income and live savings for the farmers. Farmers in Lakor sell more goats because of high demand of goat meat and high price. Trading of goats has been done by farmers and vendor, to Ambon, Papua, Kupang, Timor Timur, and Sulawesi (SALAMENA *et al.* 2013). In Kisar, sheep have been used as source of organic fertilizers on an integrated agriculture system, between corn and sheep. Staple food of Kisar people is corn, so it became the main crop planted by local people. On an integrated corn-sheep system in Kisar, sheep manure is used as organic fertilizers, while corn by-products such as fresh leaves and stems, and straws, are used as sheep feed. SALAMENA *et al.* (2013) found that 5,540 sheep produce 465,375 ton (DM basis) manure per year, while only 156,572 ton (DM basis) has been used as organic fertilizer. The excess amount of this manure has been left spreading on nature pasture or dumping in fence. Sheep is also source of income and live saving for the farmers.

### **Potential Development of Local Animal Genetic Resources of Moa Buffalo, Lakor Goat, and Kisar Sheep**

Development parameters of Moa buffalo, Lakor goat, and Kisar sheep have been found based on the “Grand Design” research on development of those animals in 2013, as can be seen in Table 6.

It can be seen from Table 6 that from economics side LQ value  $>1$ , shows excellent comparative, therefore development area (Moa, Lakor, and Kisar islands) can be stated as excellent commodities. Trend of population development is high, in which for Moa buffalo 165.45%, for Lakor Goat 124.05%, and for Kisar sheep 529.11%. This indicates that growth increases 1-5 times from population in the early year.

Data from Table 6 also show that surplus of dry matter (DM) for the buffalo is 6,768.03 ton/year which can be used to feed about 2,603 AU of buffalo. Surplus of DM for Lakor goat is 2,502.87 ton/year, so are available for 4,813.21 AU, while for Kisar sheep, surplus of DM is 4,179.38 ton/year therefore are available for 7,970.94 AU. This abundant of feed, need to be wisely utilized through preservation, and used for intensification system in raising the animals.

Table 6. Parameters of population and feed trend of local animal genetic resources.

Parameter	Moa buffalo	Lakor goat	Kisar sheep
<i>Trend of population</i>			
Population	13,012 head	16,132 head	5,540 head
Development trend 2013	165.45%	124.05%	529.11%
Location quantion	1.96	1.12	3.25
Natural increase (NI)	33.58%	188.42%	11.40%
Total breed growth	87 head	1,492 head	197 head
<i>Trend of feed</i>			
Dry matter availability	40,599.23 ton/year	3,760.46 ton/year	4,603.73 ton/year
Requirement of dry	33,831.20 ton/year	1,257.59 ton/year	424.35 ton/year
Excess of dry matter	6,768.03 ton/year	2,502.87 ton/year	4,179.38 ton/year
Increase carrying	2,603.19 AU	4,813.21 AU	7,970.94 AU

### Problems Related to Research Development

The “Grand Design” for development of these three commodities has been formulated, but integrated and planned actions facilitated by the local government and the other related side has not been taken yet. On the other hand, the potency of these local livestock should be extensively studied for, in relation to attain maximum production. Several problems faced in developing those animals which need to be examined are as follows.

1. Potency of animal source and feed have not been used optimally to meet the requirement as source of feed from animal, source of income, and source of organic fertilizers.
2. Improve quality of genes in supporting animal productivity in order to produce superior animals.
3. Strengthening capacity of local human resource, in order to support animal productivity and to use natural resources wisely.
4. Policy and regulation on conservation and to establish development area of integrated agriculture, based on animal husbandry, and other social regulation in development of animal husbandry.
5. Utilization of animal manure as source of bioenergy (biogas) and organic fertilizer.
6. The use of animal product and post-harvesting handing of animal product.
7. Control of animal diseases and health of veterinarian in the development of animal husbandry.
8. Development of Integrated Agriculture system based on Animal husbandry.

### Closing

Protection, conservation, and utilization of Moa buffalo, Lakor goat, and Kisar sheep are important for human welfare purposes, therefore real actions in form of research need to be designed covering various aspects to accelerate the achievement of the development of these potential local livestock. It is expected that in the future, Pattimura University should have a collaboration research with other universities in the world, such as Kagoshima University, in developing of these commodities. The research aspects that should be considered are local human resource capacity strengthening, genetic quality improvement, animal feedstock development including local forage and pasture quality improvement, animal diseases control, animal waste-based bioenergy development, product and post-harvesting handling, and policy and regulation aspects.

### References

- BERHITU, S. F. 2004. *Studi Karakteristik Fenotipik Ternak Kambing Lakor di Pulau Lakor di Kecamatan Moa Lakor (MOLA) Kabupaten MTB* [Study of Phenotypic Characteristics Lakor Goat in Lakor Island, Moa Lakor Islands (MOLA) Subdistrict, MTB District], *Skripsi, Jurusan Peternakan Fakultas Pertanian Unpatti, Ambon* [Thesis, Department of Animal Husbandry, Faculty of Agriculture, Unpatti, Ambon] (in Indonesian).
- FAO 2002. *Conserving and Developing Farm Animal Diversity*, Secretariat of the Report on the State of the World's Animal Genetic Resources, Rome.
- LENDHANIE, U. U. 2005. *Karakteristik Reproduksi Kerbau Rawa dalam Kondisi Lingkungan Peternakan Rakyat* [Reproductive Characteristics of Swamp Buffalo in the Community Livestock Environmental Conditions]. *Bioscientiae*, 2(1):43-48 (in Indonesian).
- MANUPUTTY, D. 2002. *Keragaan Reproduksi Ternak Domba Lokal di Pulau Kisar Kabupaten Maluku Tenggara Barat* [Livestock Reproductive Performance of Local Sheep in Kisar Island, West Southeastern Maluku District], *Skripsi, Jurusan Peternakan, Fakultas Pertanian Unpatti, Ambon* [Thesis, Department of Animal Husbandry, Faculty of Agriculture Unpatti, Ambon] (in Indonesian).
- NOOY-PALM, H. 1979. *The Sa'dan Toraja: A Study of Their Social Life and Religion*. Vol. I: Organization, Symbols and Beliefs (Volkenkunde, 87.), 338 pp., The Hague: Martinus Nijhoff.
- SALAMENA, J. F. 2006. *Karakterisasi Fenotipik Domba Kisar di Kabupaten Maluku Tenggara Barat Propinsi Maluku sebagai Langkah Awal Konservasi dan Pengembangannya* [Phenotypic Characterization of Kisar Sheeps in West Southeastern Maluku District, Maluku Province, as the First Step toward Their Conservation and Development],



*Disertasi, Sekolah Pascasarjana Institut Pertanian Bogor, Bogor* [Dissertation, Graduate School of Bogor Agricultural University, Bogor] (in Indonesian).

- SALAMENA, J. F., PAPILAJA, B. J. and RIRIMASE, P. M. 2009. *Karakterisasi dan Identifikasi Produktivitas Kerbau di Pulau Moa Kabupaten Maluku Barat Daya Provinsi Maluku* [Characterization and Identification of the Productivity of Buffaloes in Moa Island, Southwestern Maluku, Maluku Province], *Laporan Penelitian, Hibah Penelitian Strategi Nasional. Lembaga Penelitian Universitas Pattimura, Ambon* [Research Report, The National Strategy Research Grant, Research Institute of Pattimura University, Ambon] (in Indonesian).
- SALAMENA, J. F., SANGADJI, I., RALAHALO, T. N., TOMATALA, G. S. J., PATTY, Ch. W., PAPILAJA, B. J., SIWA, I. P. and TATIPIJKALAWAN, J. M. 2013. *Penyusunan Grand Design Pengembangan Sumberdaya Genetik Ternak (SDGT) Kerbau Moa, Kambing Lakor dan Domba Kisar di Kabupaten Maluku Barat Daya Provinsi Maluku* [Preparation of Grand Design of Livestock Genetic Resources Development of Moa Buffalo, Lakor Goat and Kisar Sheep in Southwestern Maluku, Maluku Province], *Laporan Akhir, Kerjasama Dinas Pertanian Provinsi Maluku dan Jurusan Peternakan Fakultas Pertanian Universitas Pattimura, Ambon* [Final Report, Cooperation between Maluku Provincial Agriculture Office and the Department of Animal Husbandry, Faculty of Agriculture, Pattimura University, Ambon] (in Indonesian).
- SIWA, I. P. 2007. *Pertambahan Alami (Natural Increase) Ternak Domba Lokal di Pulau Kisar Kabupaten Maluku Tenggara Barat* [Natural Increase of Local Livestock Sheep in Kisar Island West Southeastern Maluku District]. *Jurnal Agroforestry*, 2(2): 102-108 (in Indonesian).