

## **Peculiar Unity within the Boundary of Domestic Goat Herds and Herd Management of Karimojong in Northeastern Uganda**

**Itsuhiro Hazama\***  
**Asian and African Area Studies, Graduate School**  
**Kyoto University**

### **Abstract**

Domesticated animals in pastoral societies form a peculiar unity within boundaries that are unique to each herd. There are no reports of stable wild goat herds, whereas the domestic goat herds are sociologically stable. This study discusses a peculiar unity in goat herds based on the analysis of the proximity data of herd members observed in the Karimojong society, northeastern Uganda. I observed one herd comprising 81 goats. All goats grouped together as one herd and shared the entire day-trip herding process of leaving for grazing, grazing within a goat range and returning after grazing under the control of one shepherd. Further, the 81 goats were divided between two kraals that were fenced separately at night, thus creating two kraal membership groups. The quantitative analysis of proximity among individuals during grazing reveals that (i) the mother and infant maintain a very close bond, particularly during the nursing period, and (ii) the same kraal members are more likely to come in contact. The peculiar unity within a goat herd is formed among (a) same kraal members and (b) same herd members, with the exception of a dyadic relationship between mothers and infants during the nursing period. These results suggest that the experience of proximity within a kraal as well as within a herding ground serves to establish membership cognition during herding, and a peculiar unity is formed as a result of collective membership cognition. This account can be used to explain the absence of a peculiar unity in non-managed goat herds.

**Key words:** Proximity, kraal member, herd member, domestication, Karimojong  
*Mila (N.S.), Vol. 7 (2006), pp. 8 – 20, © 2006 Institute of African Studies*

### **Introduction**

With regard to domestication and organization of day-trip herding, it has been argued that domesticated animals in pastoral societies form a peculiar unity that is unique to each herd, which is a discernible congregation with constant membership. This is considered to be a

behavioral tendency that has developed through the transformation of animals only under a man-managed condition, and its transformational mechanism has been pursued. In particular, researchers have discussed the specific properties of domestic goats, which have the longest history of domestication. Moreover, they have focused on the domesticated goats' manner of grouping as compared with that of the wild or feral ones.

---

\* Corresponding author: Itsuhiro Hazama, Asian and African Area Studies, Graduate School, Kyoto University, Kyoto, Japan.  
Email: hazama@jambo.africa.kyoto-u.ac.jp

Accordingly, there are two remarkable characteristics of group composition among domesticated goats. Firstly, domestic goats form a peculiar unity that is unique to each herd (Imanishi 1948, Ohta 1982, 1995, Shikano 1984, 1999, Tani 1999). Imanishi (1948) observed the selective proximity between the livestock belonging to a single herd for the first time in Mongolian stock farming. He hypothesized that ungulates form groups based on a clear kinship principle and reasoned that livestock also adopt the same manner of grouping. Ohta (1982, 1995) observed that goats that graze together everyday tend to form a group and stated that a strong affinity exists between the individuals belonging to a single herd. Moreover, based on the observations of a small group of eight goats, Shikano (1999) opined that a group's boundary can emerge with individual members of the herd pursuing not 'arbitrary parts of the herd' but the 'the herd itself'. Secondly, the individuals were observed to crowd together in a homogeneous manner. In other words, the individuals belonging to one herd approached each other in a dyadic manner but collectively in a group (Shikano 1999). This opinion is keenly opposed to a part of reasoning of Imanishi who previously introduced that livestock form a group based on kinship.

How is the livestock group having such a feature formed? To answer this, the following three hypotheses have been postulated. The first hypothesis deals with the 'separation of mother and offspring' (Ohta 1982, 1995). This concept indicates a breeding way of life in which the mother is isolated from her nursing infant. This is typical in pastoral societies. The net effect of human intervention is that (a) the weakened bond between mother and infant due to the separation is 'supplemented' and 'replaced' by the bond with other herd members (Ohta 1982). According to this argument, hypothetically, in order to acquire mental stability in the absence of their mothers, the

domestic goats while grazing need to approach other individuals of the same herd with certain affinity. This is assumed to be substitute for the weakened bond between mothers and infants. However, this argument cannot explain the manner in which a peculiar unity is formed within a herd. Ohta (1995) later stated that in domestic goats, the bond between mother and offspring is not weaker than that in wild goats. Further, he made another observation regarding the effect of separating a mother from her offspring. In other words, (b) the process separates infants from their mothers, allows them to wander within the settlements and form a peer group that leads to the tendency by which the infants crowd together homogeneously (Ohta 1995, Tani 1999). In argument (a), the confusion of discussing the social relation that is considered to belong to another dimension at the same level, in which the weakened bond between mother and offspring is 'supplemented' and 'replaced' by the bond with other herd members, is cancelled by argument (b). However, the explanation provided in argument (b) does not answer the question of why boundaries emerge among groups.

The 'home range' hypothesis (Shikano 1990, 1991) postulates that under man-managed conditions, the domestic goats consider human dwellings as their own home range and the day-trip herding is a movement toward the exterior of the home range. Moreover, it is believed that while herding, the goats cope with rather endangering experiences due to the presence of a large number of other ungulates. However, this interesting hypothesis also fails to explain why a single herd is formed within a boundary that distinguishes its inside from the outside, although it can explain why the distance between individuals in a herding ground is decreased. The above argument does not clarify the following two questions: how is a herd boundary formed, and, which characteristic of the man-management condition corre-

sponds to the formation of the boundary?

In order to solve this problem, Shikano (1999) presented a new hypothesis—the ‘study of the context of guidance and pasturage’. Accordingly, the experience of grazing together under the supervision of a shepherd allows the goats to cluster, gradually form the cognition of ‘one group (whole)’ and approach this group spontaneously. In terms of shepherd intervention and goat learning, this hypothesis well explains the component of the tendency in individuals belonging to a single herd to continuously approach each other.

Although quantitative data are available, the various studies cited above have argued their case based on the qualitative data of the act of proximity resulting from a single herd united within a boundary that separates individuals belonging to a different herd. In this paper, based on the observation of goat herding in Karimojong society, northeastern Uganda, I strongly consider the formation mechanism of ‘a group with boundary’ through the quantitative analysis of ‘selective proximity’ between herds.

#### **Summary of day-trip herding & observation**

Goats are left for day-trip herding at 6.00–7.00 a.m.; they browse and rest, get watered for 30 minutes during the course of herding and are brought back to their settlement at about 5.00–6.00 p.m. The approximate distance covered in a day-trip herding is 10 km. As in other pastoral societies, the separation of mother from her offspring is practiced in Karimojong society as well. Therefore, there is little opportunity for mothers to interact with their infants, with the exception of breastfeeding in the mornings and evenings. During daytime, when the herd is allowed to graze in the bush under the supervision of a shepherd, the infants make an excursion around the settlement without receiving specific management. In Karimojong society, the lactation period of a goat is 5–7 months after the

delivery, with milking being performed in the meantime. However, those having a small quantity of milk are not milked. The unweaned infants were allowed to graze along with their mothers. For this reason, in the herd for my observation, two infants were allowed to accompany a mother goat.

The grazing herd for my observation comprised 81 goats. On their return to the settlement after grazing, they were divided and accommodated into two kraals that were separated by approximately 30 meters. These kraals were set up in two different homesteads and the male head of each homestead fundamentally owned the goats in the kraal. In this study, the goats housed within one kraal were designated as ‘kraal herd (KH)’ and those that pastured together were termed as ‘grazing herd (GH)’.

#### **Composition of GH**

The herd that I observed was housed in two kraals: ‘kraal A’ and ‘kraal B’. Every morning, the KH of each kraal was simultaneously brought at the entrance of the settlement and were left for grazing together. In addition, till the time they returned, all goats followed the same path, had the same routine of grazing, rested together in shade and were watered from one well. In this manner, the herd that pastured together was regarded as a single group – ‘grazing herd’ – despite the difference in the kraal that they originated from. The process is illustrated in Figure 1.

The following are the discernible differences among the goats on their return to the kraals (Figure 1). (1) In the evening, at the end of grazing, GH returns to the entrance of the settlement as one large group. The shepherd attends the herd till the time the GH enters the settlement. (2) An approximately 2-m wide and 20-m long pathway extends to kraal A. This pathway leads the GH to the entrance of the homestead comprising kraal A, where the herd is divided with some goats turning toward kraal B and some continuing in the direction to kraal

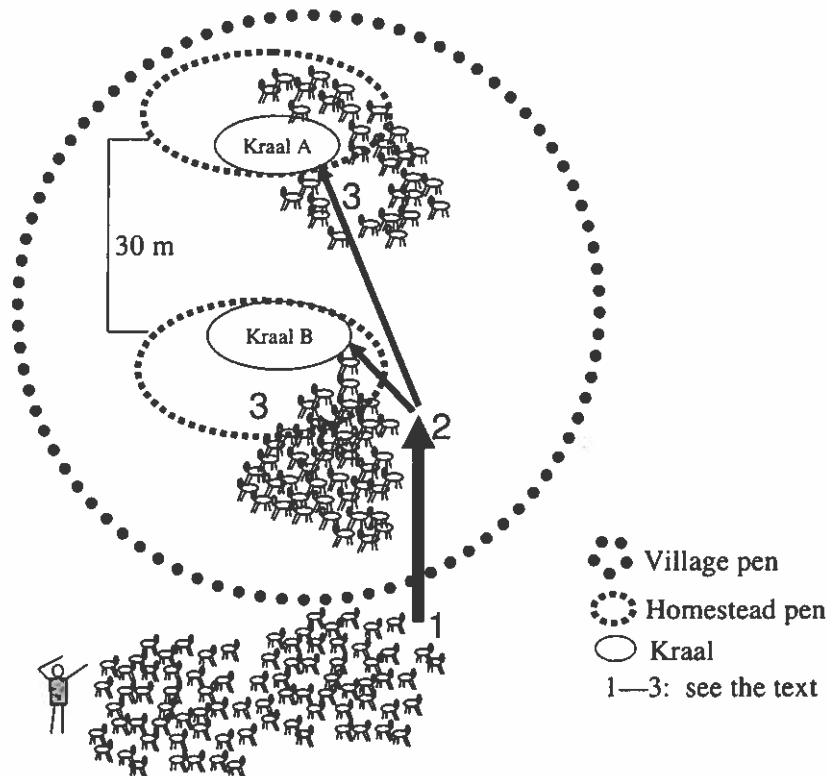


Figure 1: A model of the herd returning to the kraal

A. (3) The goats turning left walk 10 meters ahead to enter kraal B. Those moving straight walk about 30 meters ahead toward the north to enter kraal A.

Thus, even if they are not compulsorily taken to their own kraal, the GH separates into two KHs on its own at their respective kraals after returning from grazing. Table 1 lists the composition of each kraal after the goats returned from grazing. Of 81 goats, 77 returned daily to their respective kraals. The remaining four goats returned to kraal A between 1 and 3 times, while they returned to kraal B on other occasions during the investigation. Thus, almost all individuals recognized their respective kraals and were rarely lost in another kraal. Of the 77 goats, those that returned to kraal A each time during the study were designated as 'KH(A)'

and those that returned to kraal B were designated as 'KH(B)'.

From the information provided by the herd owners, this GH was formed 10 months before. Prior to co-herding, members of KH(A) grazed as a separate herd and KH(B) formed GH with another KH. The data on kinship between individuals showed that there were 33 descent groups in GH for my observation (it includes groups that have only one constituent) and that there were no individuals having kinship that were housed separately from each other.

#### Determining the proximity of the goats within the GH

How do the GH members form groups while grazing? I collected the data using the focal animal sampling method for 10 goats belonging to KH(A). The details of the goats

**Table 1: Kraal to which herd members returned**

	Individuals which returned to same Kraal		Individuals which returned to a different Kraal	Total
	Kraal A	Kraal B		
Breeding male	4	1	1	6
Castrated male	1	0	0	1
Pre-castrated male	1	0	0	1
Premature male	2	2	1	5
Multipara	22	12	0	34
Nullipara	10	0	1	11
Premature female	13	6	1	20
Infant	2	1	0	3
<i>Total</i>	55	22	4	81

\* Observation for 14 days

**Table 2: Focal sampling and focal animal information**

Focal animal	Length of observation	Number of individuals in a kinship relationship	
		Mother-Offspring	Other kinship
Multipara 1	99	0	0
Multipara 2*	126	2	10
Multipara 3	111	4	8
Multipara 4 <sup>#</sup>	94	1	0
Multipara 5 <sup>#</sup>	77	3	9
Breeding male 1	96	0	0
Breeding male 2	85	1	11
Breeding male 3	82	0	12
Nullipara 1	73	1	6
Nullipara 2	104	0	0

Notes: \* Leave the infant in the village; <sup>#</sup> Graze together with the infant

that were within a 10-meter radius of the focal animals were recorded at every 5-minute intervals (Table 2). The observation was performed in the area where the GH was left to graze. The total observation time was approximately 79 hours.

The analysis employed a 'proximity index' or simply an 'index' that evaluates the proximity between individuals. The proximity be-

tween the focal animal A and the arbitrary individual B is measured using the index formula given below. Computations were made based on this formula:

$$\text{Proximity} = \frac{\text{\# of times A \& B are within 10 m}}{\text{Total \# of times of observation of A}} \times 100$$

**Results of the proximity analysis**

Firstly, I analyzed the proximity among the individuals belonging to a single KH. The goats were classified into the following three categories based on their kinship relationship: (1) individuals having a mother-offspring relationship; (2) individuals who were related but did not share the mother-offspring relationship; and (3) individuals who had no kinship with any other individual but were in the same GH. Six focal animals met the second criteria in the GH. However, these focal animals did not show any significant difference between (2) and (3) (Table 3;  $p < 0.05$ ). Therefore, we can conclude that kinship, excluding that of mother-offspring, had no effect on the proximity.

Secondly, with respect to the mother-offspring relationship, no significant differences are observed in three multipara goats analyzed as focal animals (Table 3;  $p < 0.05$ ). However, it is likely that the lack of difference is due to the small sample size. On observing the results individually, it appears that the proximity index between mothers and offspring is high. For example, the proximity index of multipara 2 and multipara 3 to their offspring is

indicated to be two to three times as high as that of (3). In the case of multipara 4, although the proximity index to its offspring is the highest, this index is calculated based on its proximity to only one offspring. As will be described in the following section, the proximity index between mothers and infants is very high, even when it is compared with the proximity between mothers and offspring post weaning. Therefore, this index of proximity of multipara 4 cannot be considered as the general index of proximity between mothers and offspring. Multipara 5 grazed together with its offspring the same way as multipara 4, but the index of proximity to its offspring excluding that to its infant is calculated as 6.49. This index of proximity is twice as high as that of (3). The breeding male goat 2 approached its mother 1.7 times as often as (3), and nullipara 1 approached its mother three times as often as (3). From the above analysis, it is probable that the proximity index of a mother-offspring relationship is high. However, the opinion regarding this issue should be withheld. It appears that we need to increase the number of focal animals to be studied in order to clarify our opinion regarding this issue.

**Table 3:** Proximity index of focal animals with a kinship relationship

	1	2	3	4	5
Multipara 2	16.67	6.27	5.05	$P = 0.4031$	$p = 0.1184$
Multipara 3	12.01	10.81	4.73	$P = 0.0877$	$p = 0.0828$
Multipara 4	65.96	-	4.21	—**	—**
Multipara 5	19.91	7.65	3.11	$P = 0.0549$	$p = 0.0902$
Breeding male 2	10.20	5.27	5.98	$P = 0.7752$	—**
Breeding male 3	-	6.58	6.06	$P = 0.8111$	—**
Nullipara 1	13.70	5.02	4.53	$P = 0.4498$	—**

1: Mother-offspring; 2: Other blood relationship; 3: Non-related

4: Significant difference between 1 and 2\*

5: Significant difference between 2 and 3\*

\*Mann-Whitney U-test

\*\*not included in the analysis because of a small number of individuals in 2



Thirdly, the bond is the strongest between mothers and infants. In the case of two goats having infants (multipara 4 and 5), their index of proximity to their infants is significant. No other focal animal had a subject of proximity like these two goats (see Figure 2). Of all focal animals, multipara 2 and 3 grazed together with their youngest infants that were premature but weaned. However, multipara 2 also approached her first-born infant that was nullipara. Further, multipara 3 showed the highest index of proximity to her youngest infant; however, there was only a slight difference in the proximity index between the individual showing the highest proximity and the one showing the second highest proximity to this focal animal. Based on these facts, we can infer that the bond between mothers and weaned infants is not as strong as that between mothers and unweaned infants. Incidentally, Figure 2 shows that the focal animals approached the individuals of a different KH with a rather low frequency. This aspect will be discussed later. The following viewpoints can be inferred for

goats in Karimojong society: (1) Of the mother-offspring relationships, the proximity between mothers and infants that are still in the nursing period is the clearest; (2) mothers and infants leave each other after lactation; and (3) goats have a slight tendency to approach individuals in a kinship, excluding those who share a mother-offspring relationship, as shown by the goats that have no kinship.

Finally, the analysis on the proximity of members of KH(A) to those of KH(B) shows that all focal animals approached the members of the same KH, and that the indexes of nine of ten focal animals were observed to be significantly high (compare (1) with (3) in Table 4). This tendency of goats of the same KH to graze near each other is not due to the kinship relationship. Six of seven focal animals of KH(A) having kinship with other goats in their KH showed a significantly high proximity index to the nonrelated KH(A) members than to the KH(B) members (compare (2) with (3) in Table 4).

**Table 4:** Proximity index among the members of the same herd

	1	2	3	4	5
Multipara 1	4.68	—**	1.70	§§§	—**
Multipara 2	5.69	5.05	2.42	§§§§	§§§
Multipara 3	6.17	4.73	2.87	§	<i>n.s.</i>
Multipara 4	5.73	4.21	2.71	§§	§
Multipara 5	4.80	3.11	1.24	§§	§
Breeding male 1	4.96	—**	4.21	<i>n.s.</i>	—**
Breeding male 2	5.92	5.98	1.18	§§§§	§§§
Breeding male 3	6.18	6.06	2.72	§§	§§
Nullipara 1	4.75	4.53	1.31	§§§§	§§§§
Nullipara 2	5.26	—**	2.67	§§	—**

1: KH(A) (all individuals); 2: KH(A) (non-related); 3: KH(B);

4: significant difference (between 1 and 3)\*

5: significant difference (between 2 and 3)\*

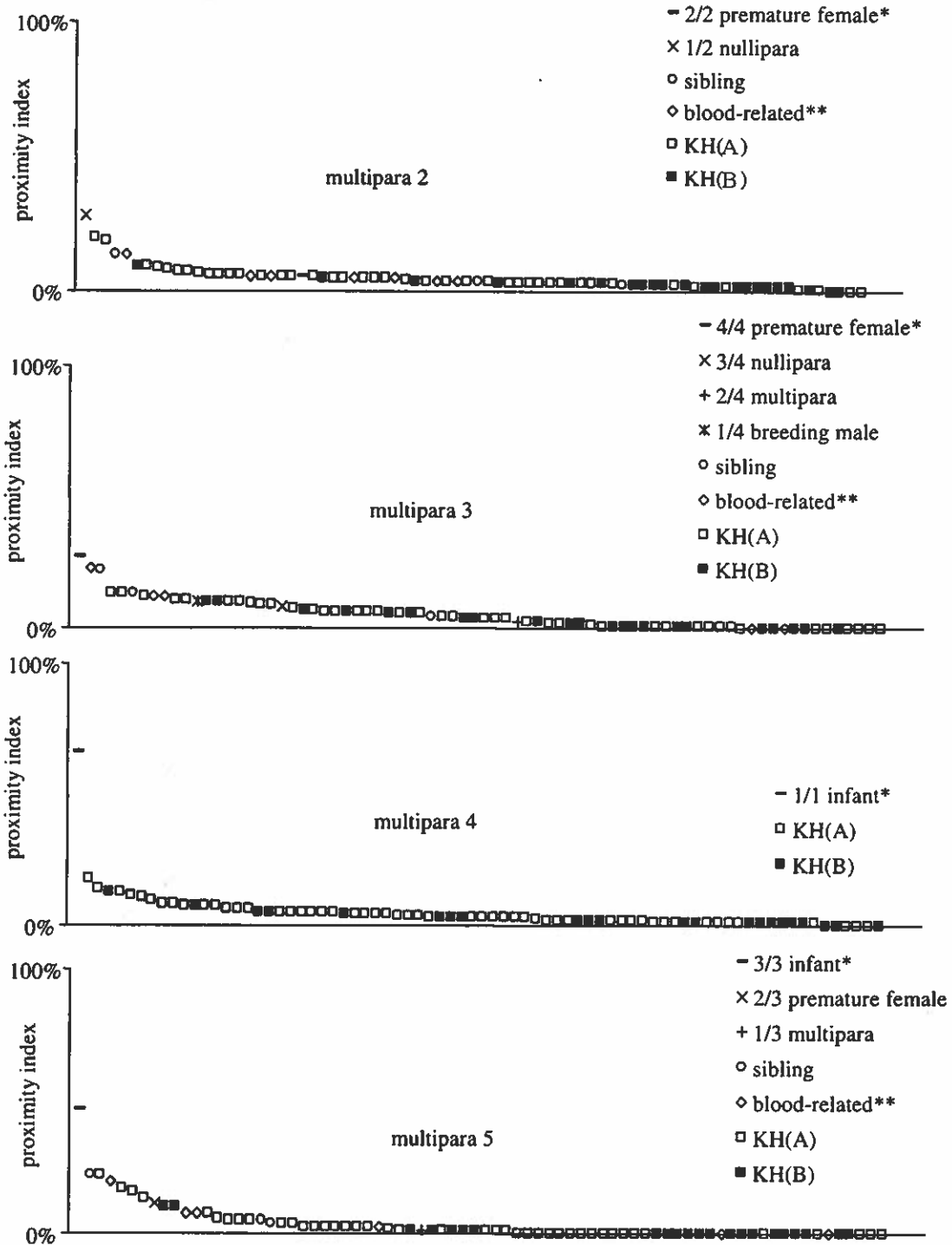
\*significant difference,  $p < 0.05$  (Mann-Whitney U-test)

*n.s.* : not significant; §:  $p < 0.05$ , §§:  $p < 0.01$ , §§§:  $p < 0.001$ ,

§§§§:  $p < 0.0001$ ; \*\*this focal animal has no kin-related animals.

Therefore, the proximity index of 1 is the same as that of 2.

## Goat Management of Karimojong in NE Uganda/Hazama



\*The denominator indicates the number of offspring and the numerator indicates the birth order.

\*\*The individuals related by blood relationship, with the exception of the mother-offspring and sibling relationships.

**Figure 2: Proximity index between multipara and other goats**



### **The unity of GH**

All previous studies reporting that the GH has its own unity have studied the GH whose members consist of a single KH. This study shows that in Karimojong society, the goats belonging to the same kraal tended to be closer to each other. This unity of the KH, however, is recognised only when we observe the relationships between the individuals within a GH. Actually also in Karimojong, the boundary of the group we can identify at first sight is that of each GH.

Similar to other GHs consisting of members of a single KH, the GH that I observed moved in close proximity four times a day: at the time of departure from the settlement, arrival at the well, arrival at the bower and return to the settlement. The members of one GH come together with those of other GHs around the settlement and at the time of returning to the settlement. Despite the mix-up, the shepherd can organise the 81 goats belonging to a single GH back into one unit within a short time without combining members from a different GH. At such times, the process proceeds as a cycle in which the shepherd approaches the scattered goats and directs them to move and join their own herd. The goats are strongly influenced by the shepherd and start moving closer to each other to join the group. As a result, the population density is heightened. Then, the individuals of the single GH join without resistance despite the difference in KHs. The three cases below illustrate this.

*Case 1:* At a distance of 500 meters from the settlement: On returning to the settlement, eight goats belonging to a single GH, seven of KH(A) and one of KH(B), were moving to the northwest in a huddle with the shepherd in tow. Three goats of KH(B) that were grazing with their heads bent low to the ground began to trot closer and joined the group from a distance of 5–7 meters. Together, the eleven goats formed a single group. In this manner, despite

belonging to different kraals, the members of the GH maintained cohesiveness for some time by changing their timing, direction of movement and walking speed. This tendency cannot be observed between the individuals of different GHs. The individuals belonging to a single GH do not come together with those of different GHs, and if brought together with members of different GHs, they begin to separate on their own.

*Case 2:* Six different GHs moved westward with the shepherd following them. One castrated goat of a different GH was observed to be standing in their way. When the flock approached the goat at a distance of 2 meters, it moved 3 meters away from the flock towards the north. Although it is a usual process that when members of a single GH come across those of different GHs in the process of moving, the individuals belonging to a different GH usually move away from the flock.

*Case 3:* At 1 km north of the settlement, three members of KH(A) and two of KH(B) were moving southward and were followed by the shepherd. When the shepherd left a while later to bring down two goats of KH(A) that were at a distance of 20 meters to the north, these goats caught up with the five goats ahead of them. However, three other goats of the different GH were herded to mix with the members of KH(A) and KH(B). These three goats reluctantly kept their distance and soon made a rapid escape to the west of the group. The other seven goats from KH(A) and KH(B) did not follow them. When the distance between the two groups was 5 meters, the three goats slowed down. It took more than a few seconds for the two GHs to separate. The remaining seven goats continued southward with each other.

The goats belonging to the different GH sometimes crowded instantly with those of another GH due to the strong influence of the shepherd; however, this 'mixing' was resolved

when the strangers wandered off spontaneously. As described above, the single GH has its own unity, subsuming more than one unity of KH at a lower level. Any new introduction from a different GH group is met with resistance, usually by those that are fewer in number.

### Shepherd's controlling behavior

The GH that I observed was shepherded by a boy, who was the son of the younger brother of the KH(A) owner. Normally, he would herd the goats by himself. He controlled the herd by physically directing the goats. I call this the 'shepherd controlling behavior'.

The shepherd was not required to control the goats all day. On following the shepherd all day, I recorded the controlling behavior at 10 seconds interval as a unit. The results reveal that his controlling behavior was observed for 6.4% (35 min/8 hrs 50 min 20 secs) and 7.9% (36 min/7 hrs 32 min 20 secs) of the grazing hour, which was defined as the whole day-trip hour excluding 30 minutes after the departure from the settlement in the morning, 30 minutes before and after watering and the rest that followed and 30 minutes before arrival at the settlement. The GH united on its own without any need for control by the shepherd.

Ohta (1982) observed that in the Turkana society in northwestern Kenya, two or three shepherds manage a herd comprising 198 goats and the controlling behavior of each of the shepherd is no more than 4.0%. Shikano (1990) reported that the controlling behavior of one shepherd managing a herd of 47 goats was approximately 1.28% of the grazing time in Samburu in central-western Kenya. Taking into consideration the difference in the number of goats assigned to a shepherd, these pastoral societies including Karimojong society have the commonality of a small labor size.

In Karimojong society, the controlling behavior consists of: (1) the body movement [i.e. (i) throwing stones, sticks or splinters of

wood; (ii) raising hands, stick or splinter of wood and (iii) beating a bucket with a stick], (2) following the herd by walking or running and (3) making some sound [e.g. whistling or vocalization]. Body movements are important to control the herds. For example, a typical body movement of a shepherd might direct goats to escape. Similarly, the auditory stimuli also caused the goats to escape. One of the types of sounds is aggressive and is accompanied by body movements pressing the goats. Other type is conciliatory and is not accompanied by this type of body movements. Typical examples of the former sounds are 'ai!' and 'si!' that have high pitch sound and tone, while the conciliatory sounds are characterized by sounds such as 'chu' and 'chupo', both of which are uvular fricative, and 'nga' and 'ngi', both of which are nasal sounds. These are some examples of the conciliatory sounds used when GH spreads out or while calling back the goats that have wandered away from the GH. According to the shepherd's explanations, these conciliatory sounds can calm down the goats and can make them stop grazing intensely; he can also call the goats back, particularly by using nasal sounds. However, the conciliatory sounds were used for only 30 of 214 units on the first day of observation and 3 of 104 units on the second day of observation. Just like the body movements, the controlling behavior using sounds also has characteristics of aggression.

### Emergence of herds with boundaries

Based on the fact that in Karimojong society, one shepherd managing a herd comprising 81 goats without any help and without losing any goats is the working system by which the goats tend to congregate depending on their social relationship. Schaller (1977) noted some common peculiarities of the subfamily *Caprinae*. One of them is the flexible membership with respect to grouping. This has also been observed among wild goats (Schaller 1977),

feral goats (Shikano 1982), domestic sheep (Kawai 1989) and feral cattle (Kimura and Ihobe 1985). The second is that there is an exceptionally strong tie of proximity between mothers and offspring (Schaller 1977). With regard to goats in Karimojong society, the suckling infants maintain a peculiar proximity to its mother, which could not be observed among other combinations of the individuals. This tendency disappears after weaning. This finding is in harmony with that in Samburu (Shikano 1990).

Domesticated goats in Karimojong society clearly differ from the wild goats in that the latter form flexible bonds with the members of the flock while the former forms a hard-edged flock whose membership has a fixed extension, as seen in both GH and KH in Karimojong society. Ohta (1982, 1995) and Tani (1999) also reported the phenomenon that domesticated goats would not unite with the members of a different GH and concluded this to be a critical difference between domesticated and wild goats. The high affinity is developed within the GH. If the goats are transferred from one GH to the other, then they cannot easily get acquainted with the herd members of the new GH and remain isolated. The goats can clearly identify the members of its own GH from those of a different GH.

How is the unity within a GH formed? The members of the two KHS that I observed in this study were repeatedly mixed to form a single GH. This process of goats constantly coming together must have resulted in a stable relationship. However, these relationships are not necessarily as strong as those within the members of a single KH but at the same time, they are not as remote as those shared among strangers. Imanishi (1972) has described such a relationship between individuals overlapping their range of movement among wild horses. Indeed goats in natural environment have the possibility of setting up mutual cognition

between individuals but in this case mutual cognition only enables individuals to make chained linkage with no independent separation discerned, unlike independent units with clear boundary within which an individual can identify its own member (Ohta 1995).

Apart from the relationship shared by a suckling infant and its mother, the next strongest relationship is that observed among the members of a KH. Goats tended to avoid being close to those belonging to a different kraal, even if they co-existed during their day-trip herding. Ohta (1982) concluded that the affinity between the members of a single GH can substitute for the weakened bond between mothers and offspring through mutual separation. In response to this, Tani (1982) reported that the tendency of the strong proximity between mother and offspring may be weakened, and therefore, the members of GH can gather as a single group. In both views, the separation of mothers from their offspring and the affinity of the single GH are closely linked with each other. Although the strongest proximity in Karimojong society is maintained between infants and their mother, the goats still do not overcome the stable proximity to their own KH members. This implies that the stable proximity within a KH is not a substitute for the severed kinship between particular individuals, such as the relationship between infants and mothers. However, similar to the unity in a GH, unity in a KH is formed by relationships that have been established through the process of goats accumulating the concrete experience of spacious, collective co-existence, which involves accommodation within a single kraal.

### Conclusion

This paper examines the manner in which a herd forms a unity in relation to man-made intervention with special reference to goat herding in Karimojong society. The results obtained reveal the following. (i) The existence of boundary of the single GH, which is in

harmony with previous observations (Ohta 1982, 1995, Shikano 1984, 1999, Tani 1999). (ii) Unlike previous studies, two KHs were observed to have their respective boundaries within a single GH. (iii) The experience of proximity in a single kraal is more effective in increasing the affinity among individuals than the experience of proximity during herding.

However, some issues have emerged and these will require further investigations. For example, is proximity within a kraal or herding trip, excluding other behaviour modifications, always a factor in forming the boundary of the herd? How and with what cue do goats establish mutual cognition leading to affinity between individuals that is strongly defined by the proximity experience? In addition, it is important and rather fundamental to establish the development of what Imanishi (1972) has termed as the 'acquaintance relationship'. The evidence observed in Karimojong society is concluded to establish the beginning of further consideration on inner interaction between individual goats within a contact experience forming a membership cognition.

#### Acknowledgements

I would first like to express my appreciation to my academic supervisor, Professor Itaru Ohta, whose thoughtful suggestions and encouragement and stimulating precedent work have been indispensable to me throughout my fieldwork and writing. The Nairobi Research Station of Japan Society for the Promotion of Science has given me great convenience during my stay in Kenya. I thank both successive directors and staff of the station. Finally I am sincerely grateful to Karimojong people, especially to my research assistants and best friends, Dengel James Nakoya and Loyep Edomo.

#### References

Dyson-Hudson N (1966) *Karimojong Politics*. Clarendon Press, Oxford.

- Imanishi K (1948) *Nomadic Theory and so forth* (in Japanese). Akitaya-Shoten, Tokyo.
- Imanishi K (1972) *Animal Society* (in Japanese). Shisakusya, Tokyo.
- Kawai K (1989) The flexible grouping and behavioral character of a flock of Suffolk ewes (*Ovis aries*). *Journal of Ethology*, Vol. 7: 41-51.
- Kimura D & Ihobe H (1985) Feral cattle (*Bos taurus*) on Kuchinoshima island, south-western Japan: Their stable ranging and unstable grouping. *Journal of Ethology*, Vol. 3: 39-47.
- Ohta I (1982) Man-animal interaction complex in goat herding of the pastoral Turkana. *African Study Monographs (Suppl.)*, Vol. 1: 13-41.
- Ohta I (1995) Contact points between "nature" and "culture" in the management of animal herding. In Fukui K (ed), *Living in the earth for symbiosis of human beings and nature-coevolution of inheritance and culture*. Pp. 193-224 (in Japanese). Yuzankaku, Tokyo.
- Schaller GB (1977) *Mountain monarchs: Wild sheep and goats of the Himalaya*. Chicago: University of Chicago Press.
- Shikano K (1982) *Sociological research on feral Ogasawara goats* (in Japanese). MSc Thesis, Faculty of Science, Kyoto University.
- Shikano K (1984) On the stability of the goat herd in the pastoral Samburu. *African Study Monographs (Suppl.)* Vol. 3: 59-69.
- Shikano K (1990) A comparative study of the goat herd structure between the feral Ogasawara goats and the domestic Samburu goats. *African Study Monographs (Suppl.)* Vol. 12: 1-33.
- Shikano K (1991) Pastoral theory from viewpoint of man-domestic animal relationship. In Tanaka J & Kakeya M (eds.) *Natural history on human beings*. Pp. 233-251 (in Japanese). Heibonsya, Tokyo.

Mila (N.S.), Vol. 7, 2006

Shikano K (1999) Day-trip herding complex from viewpoint of man-domestic animal interaction-the case of goats herd in the Samburu society in northern Kenya (in Japanese). *Minzokugaku Kenkyu*, Vol. 64 (1): 58-75.

Ministry of Finance & Economic Planning, Uganda (1994) The 1991 Population and Housing Census (National Summary) Uganda. Statistics Department, Ministry of Finance & Economic Planning, Kampala.

Tani Y (1982) Comment 1 for "Man-animal interaction complex in goat herding of the pastoral Turkana" by Ohta I (in Japanese). *Kikan Jinruigaku* Vol. 13(4): 56-60.

Tani Y (1999) Rethinking early domestication period of goats and sheep in middle and near east-a period of beginning of two assisting technique for mother-kid relationship and their meanings (in Japanese). *Minzokugaku Kenkyu* Vol. 64(1): 96-113.