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Goat production Constraints and Ethno-veterinary practices in Konso and Meta-Robi districts; Ethiopia.

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ABSTRACT:

A survey was conducted in Konso and Meta-Robi districts of Ethiopia to identify and catalog the major goat production constraints and ethno-vet practices. A total of 240 households was selected for administration of semi-structured questionnaire. The average landholding per household, including own grazing in Meta-Robi was higher than Konso. Almost all (97.5%) of respondents in Meta-Robi and majority (67.2%) in Konso indicated that land holding is decreasing. In the study areas, rivers and rain water were reported to be the major water sources during the wet season while river water was the major water source in dry season. In both study areas, disease, feed shortage and drought were the first, second and third frequently mentioned production constraints, respectively. All respondents in Meta-Robi were sedentary on the other hand, 39.8% of farmers in Konso were transhumance. In Konso, the major goat diseases were CCPP, Trypanosomiasis and External Parasites whereas, in Meta-Robi, CCPP, External parasite and foot root. The majority of farmers occasionally used cauterization and phylotherapy for treatment of some diseases. Good understanding of the relative importance of the different constraints is fundamental prior to initiating any genetic improvement program.

Keywords: Constraints, Ethno-vet practices, Goat, Konso, Meta-Robi.

1. INTRODUCTION:

In Ethiopia, livestock contributes a significant amount to export earnings in the formal market (10% of all formal export earnings, or US$150 million per annum) and informal market (perhaps US$ 300million per annum). Moreover, livestock accounts for 15 to 17% of total GDP, and 35 to 49% of agricultural GDP (Sintayehu *et al.,* 2010), and is a source of revenue for 60-70% of the population (Halderman, 2004). Despite the large size of the country's goat population, the productivity per unit of animal and the contribution of this sector to the national economy is relatively low. This may be due to different factors such as poor nutrition, prevalence of diseases, lack of appropriate breed and breeding strategies and poor understanding of the production system as a whole (Workneh *et al*., 2004).

The term 'disease' literally describes a state of 'dis-ease' or 'lack of ease'. This is a general term describing an abnormal condition of body structure and function, which is usually indicated by symptoms (Adams, 1995). Farmers of the study areas were able to identify the type of disease affecting their animals by recognizing the common symptoms through experience. Traditional veterinary practices have several advantages over orthodox medicine. In most they are easily available, cheap, readily accessible and culturally appropriate (Mathias *et al.,* 1996). It depends on culture, custom and heritage of the society and varies not only among the nations but also within the state or region. Such practice pass on from one

generation to the next on a verbal or hearsay basis and sometimes they are quite effective in the treatment of diseases and improvement of livestock production (Singh *et al.*, 2004). The aim of this study was to investigate the general goat production constraints and ethno-veterinary practices in Konso and Meta-Robi, Ethiopia.

2. MATERIAL AND METHODS:

2.1. Environmental setting of the study locations

The survey was gathered in Meta-Robi and Konso districts. Meta-Robi is located 100 km north-west from the capital Addis Ababa (Figure 1). The district lies in a hilly land scope at elevations from 1,200 to 2,900 m.a.s.l. and located at 9°20' N latitude and 38°10' E longitude. The mean annual temperature and rainfall ranges from 23°C to 31°C and 750 mm to 1100 mm, respectively. Over 95 percent of the population practices mixed crop-livestock production system (Emmenegger, 2012). Konso is located 595km away from Addis Ababa in the southwest of Ethiopia; it is located at 5° 17' 36" N latitude and 37° 29' 05" E longitude (www.google.earth.com) and lies between 600 to 2100 m.a.s.l. (Konso district agricultural office, 2008). The average total annual rainfall is 550mm; the temperature ranges between 12 to 33°C (Tesfaye, 2003). The annual rainfall variation is between 400 and 1000mm (Cheung, 2008). The production system is integrated crop-livestock system (Forch, 2003).

INSERT FIGURE 1 HERE

2.2. Data Collection

Four villages were accordingly selected from each district by considering the goat population size (based on data from the respective district agricultural offices) and relative significance of goats to the livelihood of communities. Within selected villages, list of households who owned goats and also had good experience in goat rearing were identified in reference to data at district level agricultural offices and in consultation with village agricultural Development Agents (DAs). Then from which 120 households were selected randomly for administration of the semi-structured questionnaire. Focus group discussions (FGD) were held with veterinarians and selected farmers that included the elderly, women and people believed to be knowledgeable about past and present social and economic status of the area.

2.3. Data Management and Analysis

Data collected through questionnaire were coded and entered into the Statistical Package for Social Sciences (SPSS for windows, release 14.0, 2006). For data involving frequencies, descriptive statistics were in use and Chi-square or t-test was employed when required to test the independence of categories or to assess the statistical significance. Index was calculated for ranked variable (household ranking on class of goats for selling, major goat production constraints and major goat disease) in reference to its formula: Index = Sum of (3 X number of household ranked first + 2 X number of household ranked second + 1 X number of household ranked third) given for an individual reason divided by the sum of (3 X number of household ranked first + 2 X number of household ranked second + 1 X number of household ranked third) for overall reasons.

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3. RESULTS AND DISCUSION:

3.1. Land measurement and holding system

The major land measurement unit in Konso and Meta-Robi were '*Timad*' (equivalent to 0.25 hectares) and 'Qartti afur' (equivalent to a hectare), in that order. The average land holding per household, including own grazing in Meta-Robi was higher than Konso (2.49 vs. 1.56 ha). Almost all of the respondents in Meta-Robi's and majority in Konso indicated that land holding is decreasing. The reported reasons for reduction of land holding in Konso were increment in family size and soil degradation, while in Meta-Robi soil degradation was the major reason (Table 1).

Table 1. Landholding (ha), Land use systems and Trend of the study areas

Descriptor	Konso		Meta-Robi		Overall		
	N	%	N	%	N	%	P-value
Land measurement unit							
Hectare	5	4.2	121	51.1	121	51.1	
Timad	113	95.8	113	47.7	113	47.7	
Qartii afur	-	-	3	1.3	3	1.3	
Trend in land holding							
Decreasing	80	67.2	116	97.5	196	82.4	
Stable	39	32.8	3	2.5	42	17.7	
Reason for decreasing							
Increment of family size	33	42.9	2	1.7	35	18	
Degraded	37	48.1	115	98.3	152	77.3	
Rented Out	7	9.1	-	-	7	3.6	
Landholding per household (Mean±SD)	1.56±0.96		2.49±1.6		2.02±1.39		***

****P<0.0001; N = Number of households; SD = Standard deviation*

3.2. Water Sources and Utilization

During the wet season, the major water sources were river (39% in Konso and 31.7% in Meta-Robi) and rain water (28.3% in Konso and 48.3% in Meta-Robi), while river water was reported to be the major water source (70.4% in Konso and 74% in Meta-Robi) in the dry season (Table 2). Rivers and rain

water were reported to be the major water sources of the study areas. Other researchers have reported similar findings in various places of the country. According to Workneh and Rownalds (2004), rivers were the most important sources of water during dry and wet seasons in crop livestock system households in Oromia region. Similarly, Biruh (2013) indicated that the major source of water was a pond (in Benatsemay), both pond and river (in Hamer) and river (in Dasenech).

Distance from the village to the nearest watering point during wet and dry seasons had significantly different (P<0.01) between the two study areas (Table 2). During the wet season, the majority of respondents of the study areas travels less than a kilometer to water their goats, while in the dry season, in Meta-Robi, the majority of respondents travel less than a Km but, in Konso, the majority of respondents travels up to 5 Km. Similar to this study Workneh and Rowland (2004) reported that in the Oromia region of Ethiopia, the majority of households (three-forth) and two third of households travelled their animals less than a Km in wet and dry seasons, in that order.

During the wet season, the majority (56.7%) of farmers in Meta-Robi provided ad libitum water access to their goats, but in dry season 35.6% of farmers provided once a day. In Konso, majority (84.6%) of farmers provided once a day in the wet season, but most (62.6%) of them provided once in two days during dry season. About 90% of respondents in Konso and 56% in Meta-Robi separated kids from adult and water the kids nearby home (Table 2). The frequency of provision of water to goats was smaller in Meta-Robi than Konso. This is probably due to easy accessibility of watering points in close distances in Meta-Robi district. It may also be probable that goat kept in Konso were more adapted to water shortage stress as compared to goats kept in Meta-Robi.

Table 2.Summary of water sources and their distance

Description	Wet season					Dry season				
	Konso		Meta-Robi		P-value	Konso		Meta-Robi		P-value
	N	%	N	%		N	%	N	%	
Water source										
Water well	15	12.4	-	-		-	-	7	5.8	
Dam/pond	24	20	-	-		21	18	-	-	
River	45	39	36	31.7		84	70.4	88	74	
Spring	-	-	24	20		14	11.6	24	20.2	
Rain water	34	28.3	58	48.3		-	-	-	-	
Distance of watering point					**					**
< 1 Km	66	55.5	109	91.6		10	8.5	83	68.9	
1-5 Km	53	44.5	10	8.4		86	73.5	34	28.3	

6-10 Km	-	-	-	-	4	3.4	2	1.7
> 10 Km	-	-	-	-	17	14.5	-	-
Frequency				**				**
Adlibitum	-	-	68	56.7	-	-	31	26.3
Twice a day	-	-	-	-	-	-	37	31.2
Once a day	99	84.6	39	32.5	34	29.6	42	35.6
Once in two days	18	15.4	6	5	72	62.6	7	5.9
Once in three days	-	-	7	5.8	9	7.8	8	6.7

P<0.01; N = Number of households

3.3. Major Production Constraints

In both study areas, disease, feed shortage and drought were the first, second and third frequently mentioned production constraints, respectively (Table 3). According to FGD members in both study areas feed shortage, disease and poor veterinary services were the major constraints for their goat production activities. Collective action on collection and purchase of quality feed and veterinary facilities would help them to reduce their problem. Cooperatives can be established to procure or purchase these necessities on a collective basis, which would work out cheaper apart from being available at the time needed. The previous studies in the country also demonstrated disease and seasonal feed shortage were contributing for higher limitation on small ruminant production (Tesfaye, 2008; Ahmed, 2013; Biruh, 2013).

Table 3. Ranking on major goat production constraints

Constraints	District											
	Konso						Meta-Robi					
	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I
Disease	94	11	12	4	1	0.31	51	24	22	9	10	0.25
Feed shortage	13	38	51	13	3	0.22	32	46	27	7	4	0.25
Drought	6	52	36	17	7	0.22	21	23	13	9	7	0.15
Water shortage	4	7	17	62	18	0.13	3	3	14	10	9	0.05
Predator	2	8	2	12	73	0.08	5	4	4	26	28	0.07

Market	1	2	1	11	17	0.03	2	4	9	31	25	0.08
Labor	1	0	0	0	0	0.003	0	0	0	8	4	0.07
Genotype	0	1	0	0	0	0.002	6	16	31	18	27	0.14
Theft	-	-	-	-	-	-	0	0	0	1	0	0.001

R1, R2, R3, R4 and R5 = rank 1, 2, 3, 4 and 5, respectively. I = index: Index = sum of (5 for rank 1+4 for rank 2 + 3 for rank 3 + 2 for rank 4+ 1 for rank 5) given for an individual reason (attribute) divided by the sum of (for rank 1+4 for rank 2 + 3 for rank 3 + 2 for rank 4+ 1 for rank 5) for overall reasons

3.4. Feed Shortage mitigation strategies

The experiencing of feed shortage from January to March and March to August (in Konso and Meta-Robi, in that order) was mentioned by most of the farmers in Konso and Meta-Robi. All respondents in Meta-Robi were sedentary. On the other hand, in konso 39.8% of farmers were transhumances that partly move their goat in search of feed (93.6%). Most (62.7%) of respondents moved adult goats leaving aside young, lactating, sick and late pregnant doe while 37.3% of them moved the whole flock. According to FGD participants in Konso district, mobility is practiced by some farmers' group which is locally called '*Foraa*'. The movement of animals away from the permanent residential areas is done by young boys and men. But after identifying locations suitable for mobility in terms of availability of pasture, water and the carrying capacity of the range land the adults will be returned back to their permanent home. Most of the time *Foraa* movement involves adult animals and it takes place during the main rainy season (March to June). After exploiting the pasture and flood water in the new area, they will return back to their permanent area.

3.5. Disease and Health Management

Farmers of the study areas were able to identify the type of disease affecting their animals by recognizing the common symptoms through experience. In Konso, the major goat diseases were identified as CCPP, Trypanosomiasis and External Parasites. Whereas in Meta-Robi, CCPP, External parasite and foot root was the major prevalence disease (Table 4). The mentioned diseases in both study areas were the major constraints of goat production, this might be due to it mostly occurs as an outbreak and low prevention measures like a vaccination. Discussion with Konso's veterinarians confirmed that CCPP, Trypanosomiasis, internal and external parasites are the front problems of goat production. While in Meta-Robi CCPP, PPR and Ectoparasites are important diseases.

Table 4.Ranking of major goat diseases according to prevalence by respondents

Disease	Districts											
	Konso						Meta-Robi					
	R1	R2	R3	R4	R5	I	R1	R2	R3	R4	R5	I

CCPP	93	16	4	1	1	0.4	44	13	4	1	1	0.23
Tryps	14	36	7	2	0	0.18	3	1	1	1	0	0.02
External parasite	3	12	38	15	0	0.15	13	26	19	11	3	0.2
Liver worm	4	15	5	1	0	0.07	0	1	2	0	0	0.01
Coenurosis	3	9	6	2	2	0.06	-	-	-	-	-	-
Internal parasite	0	1	4	18	1	0.04	0	1	1	0	1	0.007
Brucellosis	0	6	3	6	0	0.03	-	-	-	-	-	-
Foot root	0	2	7	3	1	0.03	16	18	11	7	1	0.16
Diarhea	1	3	4	0	0	0.02	6	11	6	5	2	0.08
Pasturolosis	0	3	2	3	2	0.02	4	3	0	1	0	0.03
PPR	-	-	-	-	-	-	23	9	5	3	0	0.14
Goat pox	-	-	-	-	-	-	11	15	6	3	0	0.11

R1, R2, R3, R4 and R5 = rank 1, 2, 3, 4 and 5, respectively. I = index: Index = sum of (5 for rank 1+4 for rank 2 + 3 for rank 3 + 2 for rank 4+ 1 for rank 5) given for an individual reason (attribute) divided by the sum of (for rank 1+4 for rank 2 + 3 for rank 3 + 2 for rank 4+ 1 for rank 5) for overall reasons

All in Meta-Robi and majority of respondents in Konso had an access to the veterinary clinic, but almost half of respondents from each study area reported that they occasionally used veterinary services for their goats (Table 5). This might be due to lack of reasonable number of animal health experts comparing with number of livestock within the study areas and poor veterinary service delivery. Discussion with districts veterinarians revealed that the facilities and supply of vaccination of government is not good enough to eradicate disease occurrence. They also mentioned poor goat health management system, the unavailability of quality of feed and using traditional medications without knowing the dosage and side effects are a problem in their communities.

The majority of respondents from the study areas obtained drugs from government clinics. Most of the respondents of the study areas acquired veterinary services by traveling 1-5 Km. Amare (2004) has reported that currently animal health clinics are abundantly distributed throughout the goat producing areas. The problem with the clinics is lack of well-trained animal health experts and lack of equipments and medicaments. There is an effort to train community animal health workers and despite the shortage of supply of medicines and equipments they are proving to be a sustainable solution to the Animal health in general and goat health problems in particular.

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Table 5. Summary of veterinary services in the study areas

Description	District				Overall	
	Konso		Meta-Robi			
	N	%	N	%	N	%
Access to veterinary clinic						
Yes	117	97.5	120	100	237	98.8
No	3	2.5	-	-	3	1.3
Type of veterinary clinic						
Government	95	80.5	107	89.2	202	84.9
Government and private	23	19.5	13	10.8	36	15.1
Distance to veterinary clinic (Km)						
< 1	-	-	8	6.7	-	-
1-5	88	73.9	92	76.7	180	75.3
6-10	17	14.3	19	15.8	36	15.1
>10	14	11.8	1	0.8	15	6.3
Provision of veterinary treatment						
Never	13	10.8	-	-	13	5.4
Occasionally	69	57.5	69	57.5	138	57.5
Regularly	38	31.7	51	42.5	89	37.1
Provision of traditional treatment						
Never	39	33.1	24	20.3	63	26.7
Occasionally	79	66.9	94	79.7	173	73.3

N = Number of households

3.6. Ethno-Veterinary Practices

From interviewing households 66.9% in Konso and 79.7% in Meta-Robi occasionally used traditional treatment (Table 5). According to FGD members, Ethno-veterinary practices were common for

the treatment of some diseases in the study areas. Similarly, Grum (2010) reported that Cauterization practice was applied for Coenurosi around Dire-Dawa and Tesfaye (2009) reported dipping of goats in the river when the animal gets sick. Belete (2009), Samares (2009) and Tesfaye (2009) also reported practicing of Cauterization in different cultures and countries.

3.7. Cauterization

According to FGD in Konso, Fire-use in the form of cauterization or branding was an intervention for Coenurosis. The point upon which cautery is applied on the back region of the neck while, Meta-Robi's farmers practiced dipping of animals into water for the treatment of Coenurosis.

Phylotherapy (Use of Medicinal Plants) and Other Traditional Medications

Some plants with therapeutic potential were utilized by both study areas. In konso, different plants such as Garlic (*Allium sativum*), Ginger (*Zinggiber officinale*) and the leaf of a plant locally known as '*Urkamayta*' were mixed and drenched their goats for healing of CCPP. Highly fermented local brewery known as '*Cheqqaa*' byproduct applied on the skin of the animal to prevent mange and they also had a practice of fumigation using Sand olive (*Dodoneae angustifolia)* and a plant locally known as '*Enggertta*' helped to acquire a disease locally named as '*Qanddotta'*. From Meta-Robi, farmers utilized leaf of plant locally known as '*Manqero*' mixing with the ash of charcoal, then drench their goats for prevention of CCPP and mixing a plant leaf locally known as '*Tatesa', 'Adeddo'* and ash of charcoal then drenched their goats to treat Pasturolosis.

4. Conclusion:

The average land holding per household, including own grazing in Meta-Robi was higher than Konso. In both study areas, rivers and rain water were reported to be the major water sources during the wet season while river water was the major water source in dry season. Disease, feed shortage, drought, water shortage, predator and market were mentioned as important constraints in the study areas. In Konso, CCPP, Trypanosomiasis and External Parasites were identified as the major goat diseases Whereas, CCPP, External parasite and foot root were the major prevalence disease in Meta-Robi. The majority of farmers in both study areas occasionally used cauterization and medicinal plants for treatment of some diseases. Good understanding of the relative importance of the different constraints is fundamental prior to initiating any genetic improvement program.

5. Figure:

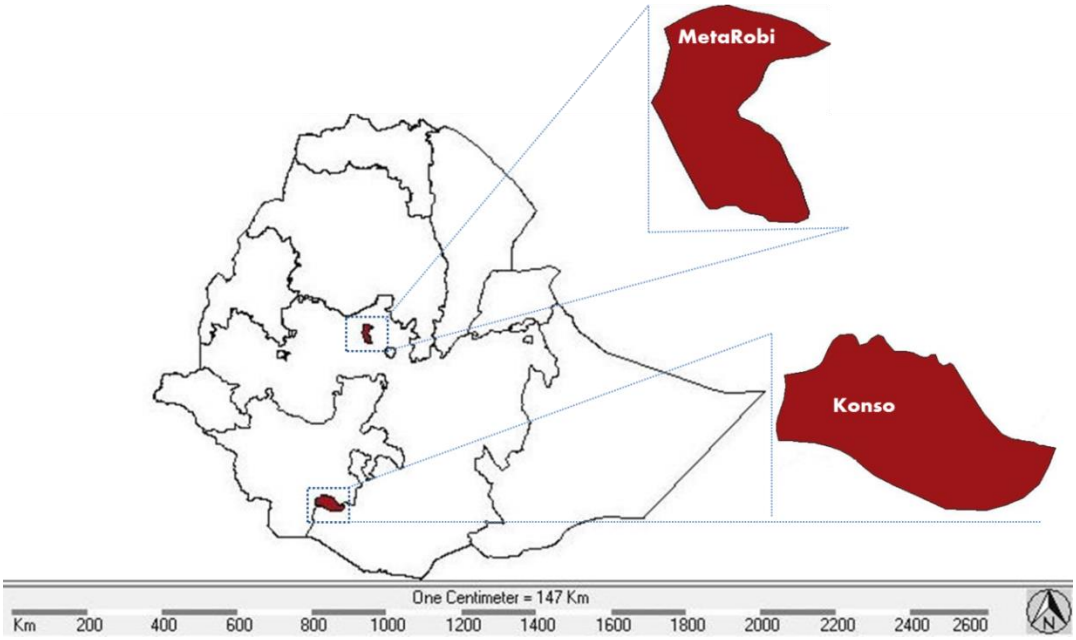

Figure 1. Map of Ethiopia and selected districts for the baseline survey.

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