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Practice of Local Mineral Supplementation to Livestock's and Perception of Farmer's in Humbo Woreda, Wolaita Zone, Ethiopia

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Abstract: The study was carried out to document practices of local mineral supplementation and perception of farmers in Humboworeda, Wolaita zone. During survey, totally 80 respondents were individually interviewed from AbalaMaraqa, AbalaQulishubo, AbalaFaricho and GalchaKebeles. In the study area (N=80), about (n=0, 0%), (n=3, 3.8%), (n=80, 100%), (n=51, 63.8%) and (n=76, 95%) of respondents were using commercial mineral mix, table salt, bole, makaduwa and mineral water, respectively and there is no significant difference (P>0.05) in kebeles. About (66.2%, n=53) and (70.0%, n= 56) of respondents obtain local mineral sources from soil lick area and local markets, respectively. Majority of the respondents (90.6%, n=48) were supplementing their animals by trekking animals to soil licking area whereas (28.3%, n=15) of respondents were collecting and carrying mineral soil to home base. In study area except for table salt (P= 0.79), supplementation for bole, makaduwa and mineral water usage varied among seasons (P<0.05).About 8.8%, 12.4%, 30.0% and 48.8% of respondents offer mineral soils (bole and makaduwa) in direct soil form, mixed with feed, mixed with boiled water and mixed with both feed and boiled water, respectively for all productive stage of livestock species except new born animal. They perceived that local mineral supplementation enhance appetite (100%), improve weight gain (97.5%), higher disease resistance (97.5%), higher milk production (95%), clear and shiny hair coat (92.5%), better body condition (91.2%) and higher conception rate (80%). In future the chemical form minerals in local mineral supplements, the interaction of mixing with other feeds, effect of graded level of supplementation; effect of feeding on reproduction performance, milk production and disease resistance on livestock should be conducted.

Key words: Bole · Makaduwa · Mineral · Livestock · Perception

INTRODUCTION

In Ethiopia livestock sector has been contributing considerable share to the national economy, for instance through export commodities of live animals, hides and skin to earn foreign exchange to the country. However, livestock productivity is very low and lags behind the growth of human population leading to a net decline in per capita consumption of livestock products [1]

Large numbers of livestock in many parts of the world consume diets that do not meet exacting requirements [2]. The major feed resources for small ruminants in Ethiopia are green forages from natural pasture, crop residues and feed grain/ other concentrates [3]. During the dry season when the available forage is low in quantity, quality and in mineral contents, what usually occurs is loss of live weight, low birth weights, lowered resistance to disease and reduced animal performance.

Mineral deficiencies are more apparent and critical nutritional constraints to animal productivity [4]. Miles and McDowell [5] reported that overgrazed pastures in Ethiopia are deficient in Calcium (Ca), Phosphorus (P), Sodium (Na), Zinc (Zn), Copper (Cu), cobalt (Co), sulfur(S) and selenium (Se), but their Iron (Fe) and Magnesium (Mn) levels are too high. Poor body conditions, slow live weight gain, low fertility and high mortality are normally observed in mineral-deficient animals [4].

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Feeds, mineral soils and water are the major mineral sources for sheep in Ethiopia [5]. *Bole* (an Ethiopian name for soil lick) is one of widely spread resource, cheap and well licked by animals once they accustomed to it. *Makaduwa* is also a type of lick soil used in Wolayta Zone, Southern Region of Ethiopia. The feeding strategies are either by trekking animals to natural mineral soil area or by bringing the mineral soil to animals holding pen. In some areas where farmers located far away from natural mineral soil area are purchasing it from local markets.In some parts of Ethiopia, supplementation with local mineral soils may provide an adequate or even excess amount of essential minerals [6].

General Objective:

- To assess the mineral soil utilization practices and marketing system at Wolayta Zone, Humbo*woreda* of Southern Ethiopia.

Specific Objectives:

- To study the practices of mineral soil utilization in HumboWoreda.
- To assess their perception on the benefits of mineral soil supplementation

MATERIALS AND METHODS

The Study Area: This study was conducted at Humbo district of Wolayta zone. Humbo district is located at 350 km south of Addis Ababa, Ethiopia. The district is located at an altitude of 1100 to 2300 meter above sea level and 6°40'N latitude and 37°50'E longitude (Figure 1). The Mean annual rainfall and temperature is 1123.15 mm and 22.0°C, respectively. The district has total area of 86, 646 hectare (ha) which is 70% of the lowland and 30% of midland [7].

Surveyon Status of Mineral Supplementation: To select the rural *kebeles*for the mineral soil study, discussions was held with elders and livestock experts of Humbo district office of agriculture. This type of discussion was intended to identify usage oflocal source of minerals for livestock and the potential livestock producing *kebeles*in the *district*.

In order to gather primary data on mineral soil supplements, both formal and informal survey with a single visit multiple subject questionnaires (ILCA, 1990) was carried out by purposive random sampling of four *kebeles* of Humbo district and totally 80 households and 40 mineral soil sellers was selected randomly from *kebeles* and Humbo markets respectively.

A pre-tested structured questionnaire was prepared for the survey. To support the structured questionnaire, focus group discussions and personal observations were made during the field work. Pre-testing was carried out to assure the compatibility of the response from the respondents with the objectives of the study. Ten households were interviewed for this purpose and the questions were restructured in a way that respondents can easily recall the questions. The single and multiple response questions was prepared to gather specific information on local mineral sources and indigenous knowledge on symptom of mineral deficiencies, perceived importance of mineral supplementation, market system of mineral sources. Trained enumerators who have the knowledge about the area and well familiar with the culture and local language were hired for the collection of data together with the researcher.

Where is the method of statistical analysis?

RESULTS AND DISCUSSION

Mineral Supplements

Types of Mineral Supplements in the Study Area: The percentage distribution of types of mineral supplements for sheep is presented in Table 1. In study area mineral soils (*Bole*and *makaduwa*) and mineral water (Springwater found at the bottom of mineral soil holes) were widely used to different livestocks as a mineral supplement. In the study area (N=80), about (n=0, 0%), (n=3, 3.8%), (n=80, 100%), (n=51, 63.8%) and (n=76, 95%) of respondents were using commercial mineral mix, table salt, *bole*, *makaduwa* and mineral water, respectively. All of the respondents (N=80, 100%) disclosed that minerals for animal supplementation were predominantly acquired from mineral soils such as *bole* and *makaduwa*. However, none of the respondents was using the commercial mineral mix. This might be attributed to meager availability and market price of commercial mineral mix in the study area as compared to local mineral sources. The trends of using mineral soil in all study *kebeles* was not statistically significant ($P>0.05$), which illustrate that all of the respondents had awareness to the importance of mineral supplementation.

Table 1: Types of mineral supplements in the study area

Mineral Supplements		Kebeles, N (%)						
		Galcha	A/ Maraqa	A/ Qulshubo	A/ Faricho	Overall	X^2	P<[0.05]
Table salt	n*	1	1	1	0	3	1.03	0.79^{ns}
	%	1.2	1.2	1.2	0.0	3.8		
Bole	n*	20	20	20	20	80	-	-
	%	25.0	25.0	25.0	25.0	100.0		
Makaduwa	n*	12	14	12	13	51	0.59	0.89^{ns}
	%	15.0	17.6	15.0	16.2	63.8		
Mineral water	n*	18	20	18	20	76	4.21	0.24^{ns}
	%	22.5	25.0	22.5	25.0	95.0		
Total (N)	n	20	20	20	20	80	-	-
	%	25.0	25.0	25.0	25.0	100.0		

Sum of responses in *kebeles* (Galcha=67; AbalaMaraka = 40; AbalaQulshubo = 63; AbalaFaricho =53; total responses of all rural *kebeles*=223); n*=number of responses, a respondent could give more than one answer to a question, hence responses could be more than the respondents; n= number of respondents per *kebeles*; N= total number of respondents; ns= not significant among *kebeles*.

In many parts of Ethiopia, sheep obtain minerals from feed, natural mineral soils and water [5]. Similarly a study conducted in the vast area of Somali region confirmed, minerals for animal supplementation were mainly obtained from natural soil, salty shrub plants and salty water [8]. The same author emphasize that mineral content of natural mineral soil known locally as Carro, which werefound in a vast area of the region and widely utilized by pastoralists. This was due to considerable amount of natural mineral soil and it is freely and easily obtainable. Likewise, in the eastern lowland of Ethiopia, various type of indigenous minerals such as rock salt, mineral soil and mineral water used by pastoral nomads for cattle and camel feeding [9, 10]. Mohammed *et al*. [11] also reported the importance of providing mineral soils in Arsi and the southeast Borena lowland. Moreover, in some parts of Ethiopia, supplementation with mineral waters and mineral soils are generally the common indigenous source of mineral supplements for livestock and may provide an adequate or even excess amount of essential minerals to animals [6, 8, 9].

Sources and Methods of Feeding Mineral Soils: Sources and method of feeding mineral soils are summarized in Table 2. In study area, mineral soils were obtained from soil lick area near Lake Abaya side and local markets. About 66.2% (N=53) and 70.0% (N= 56) of respondents got these mineral sources from soil lick area and local markets, respectively. The experience of using mineral soil from local market was greater than that of soil lick area (P<0.05). From mineral soil lick area, farmers were supplementing their animals either by trekking to soil licking area or taking soil to home. Majority of the respondents (90.6%, N=48) were supplementing their animals by trekking to soil licking area whereas (28.3%, N=15) of respondents were collecting and carrying mineral soil to home base. This is due to remoteness of soil licking area and its sufficient availability in local markets. In the same way, in Somali region mineral soils feeding strategies are either by trekking the animals to the mineral sources (Salty water wells or the natural mineral soil areas) or by bringing the mineral soil into the holding pens and supplementing the animals in the form of soil block or by mixing it with water [8]. According to TemesgenDesalegn and Mohammed [9]when the licks and/ or watering points are inaccessible to the camels, pastoralists fetch the water and soil to the nearby field where camels lick the soil or drink the water.

During the field work, the researcher observed when mineral soils licked by large numbers of animals in soil licking area. In agreement with Temesgen [12] the location of mineral soil in contains scattered trees, dwarf shrubs and each lick area contains numerous holes and some have caves. These holes and caves indicate the extensive and occasional use of mineral soil by animalsand humans for marketing purpose.

Seasons of Mineral Supplementation: Seasons of mineral supplementation are summarized in Table 3. In present the study, *bole* supplemented all the year (60%), dry season (35.0%) and wet (5.0%). *Makaduwa* also supplemented all the year (52.9%), dry season (35.2%) and wet season (11.8%). In study area except for table salt (P= 0.79), supplementation for *bole*, *makaduwa* and mineral water usage varied among seasons (P<0.001). The trends of supplementing *bole* (35.0%) and *makaduwa* (35.2%) in dry season are higher than *bole* (5.0%) and *makaduwa* (11.8%) in wet season. The differences in seasonal nature

Table 2: Methods of feeding mineral soil in different *Kebeles* of Humbo *district.*

		Kebeles, N (%)						
Sources of mineral soil		Galcha	A/ Maraka	A/ Qulshubo	A/ Faricho	Overall*	X^2	P<[0.05]
Soil lick area	n*	10	18	10	15	53	7.54	0.15^{ns}
	%	12.5	22.5	12.5	18.8	66.2		
Local markets	n*	16	5	17	18	56	26.19	0.00**
	%	20.1	6.2	21.2	22.5	70.0		
Total (N)	n	20	20	20	20	80	-	-
	%	25.0	25.0	25.0	25.0	100.0		
Methods of feeding								
Trekking animals	n*	7	16	10	15	48	7.18	0.06^{ns}
	%	13.2	30.2	18.9	28.3	90.6		
Taking soil to home	n*	4	7	2	2	15	3.66	0.30^{ns}
	%	7.5	13.2	3.8	3.8	28.3		
Total (N)	n	10	18	10	15	53	-	-
	%	18.9	34.0	18.9	28.3	100.0		

n*=no. of responses; n=total number of respondents per *kebele*, N=Total number of respondents,

Table 3: Seasons of mineral supplementation to sheep in the study area

		Kebeles, %										
		Galcha		A/ Maraqa		A/ Qulshubo		A/ Faricho		Overall		
Minerals Season		n*	%	n*	%	n*	%	n*	%	n*	%	Sig
Table salt	Dry	1	33.3	0	0.0	0	0.0	0	0.0	1	33.3	
	Wet	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	ns
	All the year	0	0.0	1	33.3	1	33.3	0	0.0	2	66.7	
Bole	Dry	7	8.8	8	10.0	7	8.8	6	7.5	28	35.0	
	Wet	0	0.0	2	2.5	0	0.0	2	2.5	4	5.0	***
	All the year	13	16.2	10	12.5	13	16.2	12	15.0	48	60.0	
Makaduwa	Dry	4	7.8	5	9.8	2	3.9	7	13.7	18	35.2	
	Wet	0	0.0	1	2.0	5	9.8	0	0.0	6	11.8	***
	All the year	8	15.7	8	15.7	5	9.8	6	11.8	27	52.9	
Mineral water	Dry	15	19.7	16	21.1	17	22.4	18	23.7	66	86.8	
	Wet	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	***
	All the year	3	3.9	4	5.3	1	1.3	2	2.6	10	13.2	

***= P<0.001; ns=not significant; n*=number of responses

of mineral soils use have been also reported by Temesgen Desalegnand Mohammed [9]. Farmers perceived that these sources of minerals have adequate minerals concentration to animals especially when the forage quality is inadequate to meet mineral requirement. Similarly, ourresults werein agreement with McDowell [13] who reported that as tropical forages had less minerals content during the dry season, so that grazing livestock did suffer mineral inadequacies during this time.

In the study area, most farmers used to supplement their animals with mineral soil independent of the season. They supplement *bole* (60%) and *makaduwa* (52.9%) all the year around. This finding is in contrast with Sisay Tilahun *et al.* [8] who reported that only 20% of respondents used minerals all the year round in Jijiga and Shinle Zones. This could be due to availability in markets, better understanding and interest of farmers in improving their animals by feeding natural mineral soil and they believed that better performance and improved health conditions are likely to be attained through mineral supplementation. Moreover, the sufficient availability of mineral soil in local markets of study area is also help farmers to supplement mineral all the year around.

In the wet season, *bole* (5%) and *makaduwa* (11.8%) used in study area. The result showed that bole and makaduwa were used by herders to supplement the wet season. According to the perception of respondents, the reason for the higher value of *makaduwa* is the ability to control bloat and diarrhea related with lush forages in wet season. This could be associated with the fact that during change the animals from high fibrous diet in dry season to lush wet season forage plant, fermentable carbohydrates

and protein increase and fiber content is decreased that alter rumen pH and impair microbial function. Ruminants exposed to sudden drops in dietary fiber produce less saliva, which is high in bicarbonates [14]. With less saliva, the buffering capacity of the rumen is reduced [15] and can lead to a drop in pH below optimal conditions for rumen microbes, making several intestinal diseases that decrease appetite and weight gain [15].

Supplemental sources of carbonates during the transition to spring forage can improve the buffering capacity of the rumen when saliva secretion is compromised [14]. The effectiveness of sodium bicarbonate in alleviating acidosis is reported [16]. Clay minerals soils have high cation exchange capacities which also enhance buffering capacity [17]. Makaduwa have clay texture, so according to those facts *Makaduwa* may help to adjust and maintain proper osmotic balance and pH of the rumen.

In the study area mineral water mostly preferred in dry season (86.8%) in all areas. According to farmers animals choose mineral water than mineral soils in the dry season. This could be due to during dry season the hot temperature increase water demand and regarding to minerals, their need for Na^+ and K^+ increased due to the electrolyte imbalance generated at cellular level. The higher need of Na^+ is attributed to increase in secretion of urine that reduces the plasma concentration of aldosterone. Instead, the increased demands for K^+ are attributable to an increased removal of this element with sweat. Moreover, some hard waters also supply significant amounts of calcium, magnesium and occasionally of other minerals [18]. Therefore, watering herds/flocks in the salty wells was one way of providing minerals to sheep and goats during the dry season.

Frequency of Feeding Mineral Supplements: Frequency of feeding mineral supplements is summarized in Table 4. *Bole*, *makaduwa* and mineral water supplementation significantly ($P<0.001$) varied between intervals and most of farmers near the source supplement weekly and 15 days interval. In study area, 22.5% (n=18), 41.2% (n=33), 36.2% (n=29), 0% and 0% of respondents supplement *bole* daily, weekly, 15 days interval, monthly and more than month, respectively. About 0%, 21.6% (n=11), 43.1% (n=22), 31.4% (n=16), 3.9% (n=3) of respondent farmers also supplement*Makaduwa* daily, weekly, every 15 days interval, monthly and > monthly intervals, respectively. Most number of respondents supplement *bole* in weekly interval and *makaduwa* in monthly interval, respectively, this could be due to distance to soil lick area and market day (Once in a week) also related to cost of unaffordability to buy it for a weekly demand. Regarding to *Makaduwa,* it is costly than *bole* in local markets and not sufficiently available in lick areas and local markets. The present result is in contrary to Sisay Tilahun *et al*. [8] who reported that in the Harshin district of Somali region, pastoralists provided mineral soils to their sheep and goats only at 3 to 6 months' intervals. This could be due to the availability of mineral soil in local markets in addition to using soil lick area. Therefore, farmers frequently supplement mineral soil when compared with other studies.

Mineral water is supplemented in daily (n=3, 3.9%), weekly (n=19, 25.0%), 15days (n=22, 28.9%), monthly (n=24, 31.6%) and >month (n=8, 10.5%) interval. There is statistically significant variation in mineral supplementation among intervals, which is mostly supplemented in monthly intervals. In the study area, *kebeles* near to mineral water site use a weekly interval especially in dry season. For instance, animals in AbalaFaricho*kebele* who are closed to mineral water site had an opportunity to drink in every week (n=8, 10.5%) and 15days (n=6, 7.9%) interval.

Types and Times of Feeding Mineral Soil: The forms and times of feeding mineral soil to animals in study areas are presented in Table 5. About 8.8%, 12.4%, 30.0% and 48.8% of respondents disclosed that forms of offering mineral soils in animal rations included direct soil form, soil mixed with feed, soil mixed with boiled water and soil mixed with both feed and boiled water, respectively. According to respondent farmers, mix with both boiled water and feed may increase intake of fibrous feed. They perceive that boiled water increase milk production, facilitate digestibility of mineral soil and deworm internal parasite. Their perception on milk production disagrees with Wilks *et al*. [19] who reported the cooling of drinking water temperature, at 10°C increase milk production (26.0 vs. 24.7 L/ cow/day) as compared to animal's drinking water of 27°C. The present study was also contrasted with Sisay Tilahun *et al*.[8] in that 81 and 80% fed in powder form while 5.8 and 19% fed them by mixing with water in Shinile and Jijiga zones of Somali national region, respectively. Sisay Tilahun *et al*. [8] suggested that mixing with water is easier to provide and animals were forced to take minerals and water at the same time.

Table 4: Frequency of feeding mineral supplements in the study areas

		Kebeles										
		Galcha		A/ Maraqa		A/ Qulshubo		A/ Faricho		Overall		
Minerals Intervals		n*	%	n*	%	n*	%	n*	%	n*	%	Sig
Table salt	Daily	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	Weekly	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	15 days interval	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	-
	Monthly	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	> month	1	33.3	1	33.3	1	33.3	0	0.0	3	100.0	
Bole	Daily	5	6.2	5	6.2	4	5	4	5.0	18	22.5	
	Weekly	9	11.2	8	10.0	8	10.0	8	10.0	33	41.2	
	15 days interval	6	7.5	7	8.8	8	10.0	8	10.0	29	36.2	***
	Monthly	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	> month	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
Makaduwa	Daily	0	0.0	0	0.0	0	0.0	0	0.0	0	0.0	
	Weekly	3	5.9	2	3.9	3	5.9	3	5.9	11	21.6	
	15 days interval	4	7.8	8	15.7	4	7.8	6	11.8	22	43.1	***
	Monthly	5	9.8	4	7.8	5	9.8	2	3.9	16	31.4	
	> month	0	0.0	0	0.0	1	0.0	2	3.9	3	3.9	
Mineral water	Daily	0	0.0	0	0.0	1	1.3	2	2.6	3	3.9	
	Weekly	1	1.3	4	5.3	6	7.9	8	10.5	19	25.0	
	15 days interval	3	3.9	6	7.9	7	9.2	6	7.9	22	28.9	***
	Monthly	7	9.2	10	13.2	4	5.3	3	3.9	24	31.6	
	> month	7	9.2	0	0.0	0	0.0	1	1.3	8	10.5	

***= P<0.001; n*=number of responses; Sig= significant level at intervals.

Table 5:" Forms and times of feeding mineral soil to animals in study areas.

		Kebeles, % respondents				
		Galcha	A/ Maraqa	A/ Qulshubo	A/ Faricho	Overall
		%	%	%	%	%
Types of feeding	Direct soil form	2.5	1.2	3.8	1.2	8.8
	Mix with feed	6.2	1.2	1.2	3.8	12.4
	Mix with water	6.2	8.8	7.5	7.5	30.0
	Mix with feed and water	10.0	13.8	12.5	12.5	48.8
Time of feeding	Morning before grazing	13.8	17.5	18.8	21.2	71.2
	In the afternoon	3.8	1.2	2.5	1.2	8.8
	Night time in enclosure	7.5	6.2	3.8	2.5	20.0

In the current study, about 71.2% of respondents fed mineral soil in the morning before grazing while 8.8% and 20% fed during afternoon and night time in enclosure after grazing. According to the respondents, feeding mineral soil before grazing time increase appetite and feed intake during grazing, respectively. This study agrees with Sisay Tilahun *et al*. [8] who reported that sheep and goat had good aspiration to graze after licking mineral soil.

Productive Stage of Mineral Soil Supplementation: All respondents in the entire the study area supplement mineral soil for all productive stages such as yearlings, lactating and fattening animals except for new born and pregnant animals (Table 6). According to respondents, new born animals do not have good desire until one year and also it causes abortion for pregnant animals if they fed excess mineral soil. This shows farmers awareness of minerals importance to growth, lactation and fattening. According to Sisay Tilahun *et al*. [8] most of the pastoralists (72.5 %) in the Somali region provided minerals for sheep and goat at to above yearling age, lactating and fattening animals. This was due to pastoralists' recognized better performance and body confirmation of their animals and they could get better price if they wanted to sell the animals. Moreover, Gatenby [20] reported that the mineral requirements of small ruminants depend on their age, productivity and adaptation to the area. Likewise, Kabaija and Little [21]

Table 6: Percentage distribution of productive stage of mineral soil supplementation

	Responses	
Productive stage	n*	%
More than one year	80	100.0%
Lactating	80	100.0%
Fattening	80	100.0%
Total	240	300.0%

n*= number of responses

Table 7: Perception of farmers in relation to importance of mineral supplementation in study area

	n*	%
Better appetite	80	100.0
Higher weight gain	78	97.5
Better body condition	73	91.2
Higher disease resistance	78	97.5
Clear and shiny hair coat	74	92.5
Higher conception rate	64	80.0
Higher milk yield	76	95.0
Total	523	653.8

n*=number of responses; number of responses may greater;% =based on number of responses

confirmed that mineral deficiencies can result in depression of animal performance. In addition, the authors emphasized that sub clinical mineral deficiencies are often widespread in Ethiopia and are responsible for great economic losses in livestock.

Perceived Importance of Mineral Soil Supplement: The importance of providing mineral soils is well known in entire study area (Table 7). All respondents perceived better appetite (100%), higher weight gain (97.5%), better body condition (91.2%), higher disease resistance (97.5%), clear and shiny hair coat (92.5%), higher conception rate (80%) and higher milk yield (95%). Respondents in the present study perceived that feeding mineral soil is fundamental components of feeding strategies to meet mineral demand to livestock. According to Eksteen and Bornmann [22] and Temesgen [12] lick soil is a source of minerals and maintain minerals equilibrium in the body of animals [23].Minerals in lick soil may satisfy the seasonal demands of lactation, calving and growth of bones, horns or tusks [24]. They may help to offset gastrointestinal ailments [25]. Certain minerals affect immunity and may affect disease susceptibility in animals. Reduced disease resistance has been observed in ruminants deficient in some mineral deficient animals. It may also reduce the effectiveness of vaccination programs by reducing the ability of the animal's immune system to respond for vaccination [13].

CONCLUSION

The study was conducted in HumboWoreda, Wolayta Zone of Southern Ethiopia with objectives to assess practices of mineral soil supplementation, marketing of mineral supplements.

Totally 80 households and 40 sellers randomly selected from four kebeles selected by purposive random sampling method. Data regarding practice of mineral supplementation and marketing system gathered by structured questioners and visual observation.

From survey finding, about 0%, 100%, 63.8% and 95.0% use commercial mineral mix (CMM), *bole*, *makaduwa* and mineralwater respectively. Farmers acquired mineral soil from soil lick area (66.2%, N=53) and local markets (70.0%, N=56). Those who use soil lick area feed their animals either by trekking animals to source area (90.6%, N=48) or taking the soil to home (28.3%, N=15). They feed mineral soils by soil form (8.8%), mix with fed (12.4%), mix with water (30.0%) and mixing with feed and water (48.8%). Farmers perceive that supplementation of mineral enhance appetite (100%), weight gain (97.5%), better body condition (91.2%) disease resistance (97.5%), conception rate (80%), milk production (95%) and hair coat quality (92.5%).

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