



Effect of quality attributes on prices of small ruminants in Somaliland: A farmers' perspective using 'best-worst approach'

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The livestock sector employs over 70% of the Somaliland population, contributes about 60% of the GDP and 85% of foreign exports earning (Ministry of Planning, 2011). In 2014, sheep and goats exported exceeded 3 million heads mainly to the Middle East, with Saudi Arabia accounting for 2.4 million (79%) of these exports (SCCIA, 2015).

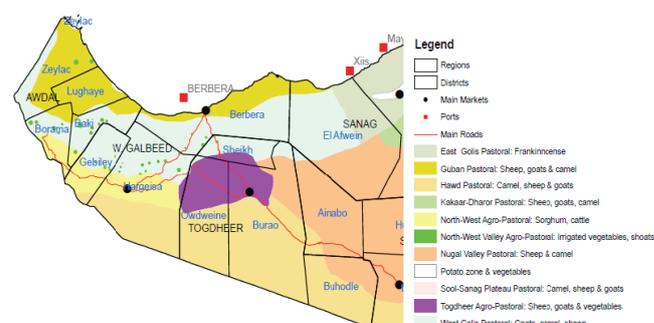
Market actors participating in the value chain include livestock producers, small-scale traders, brokers, agents of exporters', exporters and importers. The final price is set by importers based on the grade of the animal. The three grades of export quality small ruminants are based on age, conformation and body condition (Negassa et al., 2008).

Livestock keepers' knowledge of this grading system and its influence on price are not well known. A recent study (Wanyoike et al., 2015) showed that most livestock keepers are well versed with the grading system. It is not clear whether they consider that grade influences price, and more importantly how each attribute determining grade individually affects their first point of sale markets.

Study area and data collection

Data was collected through 200 household surveys in two zones: West Golis (a pastoral zone with goats, camels and sheep) and Togdheer, an agro-pastoral zone where rearing of sheep and goats as well as vegetable production are practiced (figure 1). The sample was almost balanced in terms of gender distribution (46% men and 54% women).

Figure 1. Study area and livelihood zones covered



(Source: FSNAU, 2011) 2011)

A questionnaire was developed, pretested and revised to collect data various factors including flock sizes, husbandry and marketing practices. Embedded in the questionnaire was a section where respondents were presented with a set of 13 choice cards. Each card included a set of four attributes that was thought to influence the selling price of a sheep or goat. Respondents were asked to indicate he most and least important attributes that influence the selling price of an animal.

Table 1 summarizes the 13 attributes used and Figure 2 shows an example of a choice card. The selection of the 13 attributes was based on findings of a previous survey, interviews with key informants, and literature review.

Table 1. Attributes used on choice cards

Attributes
1. Age of the animal
2. Apparent fat of the animal
3. Breed of the animal
4. Coat color of the animal
5. Conformation of the animal
6. Demand season
7. Grade of the animal
8. Health of the animal
9. I know the trader
10. Live weight of the animal
11. Nutritional status of the animal
12. Payment in cash
13. Sex of the animal

From the individual standardized Most-Least scores calculated from the Best-Worst experiment (see box 1 for details), a cluster analysis was used to segment respondents into different groups. A nonhierarchical cluster analysis (k-means method) was applied. Socio-demographic and other marketing and production variables were used to externally validate and characterize the groups and to provide additional insights into the composition of each group (Ketchen and Shook, 1996).

Box 1. Best-Worst scores

For the choice experiment data Standardized Most-Least scores (generally known as Best-Worst scores) were calculated to assess respondents' stated importance of the various attributes, and the importance of their respective levels. The standardized scores are calculated as follows:

$$\text{Standardized Most - Least Score} = (\text{No. Most} - \text{No. Least}) / (m \cdot n)$$

- No. Most: number of times the attribute was chosen as most important
- No. Least: number of times the attribute was chosen as least important
- m: number of respondents = 196*
- n: number of times the attribute was presented to each respondent = 4
- Positive values of Most minus Least mean that the given attribute was chosen more frequently as "Most" than "Least" and negative scores mean the opposite.
- *Four (4) respondents have not completed the best-worst questions

Farmers' perceptions of effect of quality attributes on price

Table 2 and figure 3 present the apparent importance of attributes that influence the price received by producers for small ruminants presented for sale. The most important attributes were health status, demand season and grade of animal. In addition, conformation of the animal as well as its nutritional status, all which influence grade, were also identified as important determinants of selling price.

Figure 2. An example of a choice card

Please indicate which to you is the most and least important attribute that influence the price when you sell a **sheep or a goat?** (Tick only one case as most important and one case as least important)

Most important	Attributes	Least important
<input type="checkbox"/>	Breed	<input type="checkbox"/>
<input type="checkbox"/>	Sex	<input type="checkbox"/>
<input type="checkbox"/>	Age	<input type="checkbox"/>
<input type="checkbox"/>	Coat color	<input type="checkbox"/>

The perspective revealed from producers seems to be in tandem with phenomena in both local and international markets. For example, unhealthy animals are not exported. In the recent past, Somali livestock exports to the Middle East were banned for almost a period of 10 years (1999/2009) because of the Rift Valley fever outbreak, and this perhaps explains why health status was ranked as the most important attribute with relative importance of 100%.

Table 2. Standardized attributes' scores

Attributes	Best	Worst	Score	Std.*	Relative importance**
Age	163	196	-0.0421	0.4025	21.9%
Apparent fat	250	167	0.1059	0.3995	29.4%
Breed	32	344	-0.3980	0.3887	7.3%
Coat colour	72	479	-0.5191	0.4675	9.3%
Conformation	402	53	0.4452	0.4017	66.2%
Demand season	410	89	0.4094	0.4103	51.6%
Grade	288	68	0.2806	0.4149	49.5%
Health of the animal	381	22	0.4579	0.3614	100.0%
I know the trader	55	402	-0.4426	0.3548	8.9%
Live weight	131	144	-0.0166	0.3865	22.9%
Nutritional status	176	55	0.1543	0.3061	43.0%
Payment in cash	91	269	-0.2270	0.3445	14.0%
Sex	97	260	-0.2079	0.3961	14.7%

*Standard deviation from the individual scores

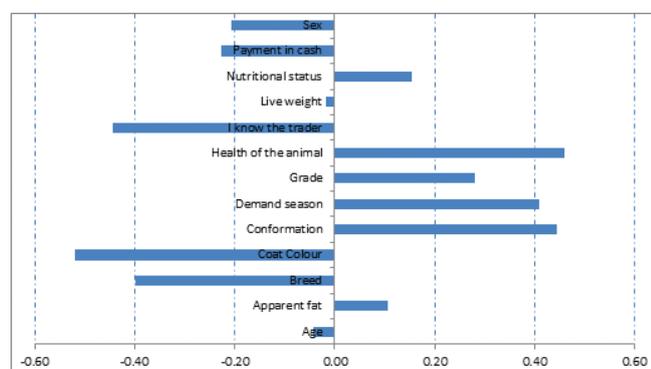
**Calculated from the square root of the ratio of the attribute best frequency by the attribute worst frequency and taking the Highest attribute (health of the animal) as the reference level (100%).

Demand season was also identified as one of the key attributes influencing the selling price of small ruminants. There are two marketing chains for small ruminants traded in Somaliland, namely the commercial livestock value chain and the sacrificial animal value chain. The latter corresponds to the peak demand season, where a large number of animals are traded and exported within a window of 60 days around the Muslim Hajj season leading to above-average market prices.

This high demand also leads to relaxation of the stringent grading requirements practiced in the commercial value chain that operates the remaining 300 days of the year. The commercial value chain is associated with high quality requirements, more supply and lower prices, ostensibly explaining why demand season is ranked higher than grade.

During the peak demand season, animals are selected based on specifications prescribed in the Sunna where appropriate fullness of an animal (i.e. good conformation) is demanded. It is clear that higher ranking of conformation is not by chance. During this window, conformation supersedes grade and other attributes like body condition, sex and age. In the off-peak season, body condition and conformation gain more or less equal importance.

Figure 3. 'L-W' average scores of attributes influencing small ruminants' price



This analysis reveals accurate producer-level awareness of the attributes that influence price and by extension incomes. This is an indication of positive impact of recent outreach programs by the government and development partners that will need to be sustained and expanded.

Farmers' segmentation and group perception of quality attributes

A more nuanced look at the data shows lack of homogeneity in the spread of this knowledge. This is revealed by the high dispersion and variability of the scores, especially live weight, age, apparent fat and nutritional status. To better delineate this heterogeneity, respondents were segmented into three groups. Results are summarized in table 3 and graphically represented in figure 4.

There are similarities as well as differences between the three groups. They have almost the same size (between 31% and 37% of total sample size). Mean scores of groups 1 and 2 are higher in absolute value compared to those of group 3. Respondents from group 1 allocate, overall, higher importance to grade attribute compared to groups 2 and 3. Demand season and conformation were ranked second and third by group 1 respondents as influencing selling prices. For group 2 respondents, both the demand season and animal conformation were also ranked among the most important attributes. Animal health, however, was ranked first as most important, which differs from the ranking provided by groups 1 and 3. For group 3, there is a bundle of attributes with relatively the same importance on price setting: animal health, live weight, conformation, apparent fat, and animal grade.

Differences are also noticeable when comparing the least important attributes. Coat color was ranked least important in selling prices by groups 1 and 2; especially group 2 respondents almost unanimously chose this attribute as least important (mean score=-0.8968 and Std.=0.1831). Animal breed and I know the trader, were also ranked among the least influential factors in price

setting by groups 1 and 3. For group 2, attributes ranked as least important and with close average scores. were: I know the trader, animal age, live weight and sex.

Table 3. Average standardized attributes scores by groups

Attributes	Group 1 (n1=60)	Group 2 (n2=63)	Group 3 (n3=73)
Age*	0.2417 ^a	-0.3651 ^b	0.0034 ^c
Apparent fat*	-0.1917 ^a	0.2738 ^b	0.2055 ^b
Breed*	-0.5458 ^a	-0.0794 ^b	-0.5514 ^a
Coat colour*	-0.6542 ^a	-0.8968 ^b	-0.0822 ^c
Conformation*	0.5542 ^a	0.6111 ^a	0.2123 ^b
Demand season*	0.5875 ^a	0.5913 ^a	0.1062 ^b
Grade*	0.7542 ^a	-0.0436 ^b	0.1712 ^c
Health of the animal*	0.2750 ^a	0.8095 ^b	0.3048 ^a
I know the trader	-0.5042	-0.4603	-0.3767
Live weight*	-0.0250 ^a	-0.3214 ^b	0.2534 ^c
Nutritional status*	0.1000 ^a	0.2936 ^b	0.0788 ^a
Payment in cash*	-0.3500 ^a	-0.1032 ^b	-0.2329 ^{a,b}
Sex*	-0.2417 ^{a,b}	-0.3095 ^a	-0.0925 ^b

* indicates that the null hypothesis of equality of means is rejected at 1% level
a,b,c,d Average scores in the same row with different subscripts are statistically different at 5% level

External validation of livestock producers' groups allows its better characterization by the use of socio-demographic and other production and marketing variables.

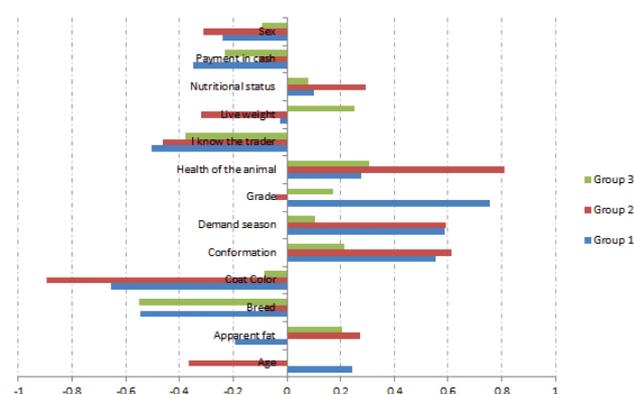


Figure 4. 'L-W' average scores by groups

Table 4 summarizes the results of the statistically significant variables. Group 1 composition is almost balanced between men and women, in group 2 men's presence is slightly higher and in group 3 women dominate.

Table 4. External characterization of the groups

Variable	Level	Group 1	Group 2	Group 3
		(n ₁ =60)	(n ₂ =63)	(n ₃ =73)
Gender of the respondent***	Man	52%	59%	30%
	Woman	48%	41%	70%
HH head only sales decision making***	Yes	66%	40%	63%
	No	34%	60%	37%
Gender of HH head*	Man	88%	77%	79%
	Woman	12%	23%	21%
Age of HH head**	Years	45.1	40.9	47.9
Selling more younger animals**	Yes	26%	20%	9%
	No	74%	80%	91%
Selling more older animals***	Yes	44%	14%	76%
	No	56%	86%	24%
Selling animals with better body conformation***	Yes	58%	61%	31%
	No	42%	39%	69%
Selling more of males animals***	Yes	81%	61%	83%
	No	19%	39%	17%

***, **, * Statistically significant at respectively at 1%, 5% and 10% levels.

Who decides on sales differs between the groups. In groups 1 and 3 almost two thirds of respondents say the household head is the only decision-maker, the opposite figure is observed for group 2 where decisions to sell are jointly taken. This could be because young spouses are more willing to consult each other.

Livestock keepers were also asked if they have tried to improve the characteristics of their animals. Statistically significant differences between groups are reported in table 4. Proportions of groups 1 and 2 respondents who tried to sell younger animals are higher compared to group 3. - who say they have tried to sell older animals. From a previous study (Wanyoike et al. 2015) and from field observations, we know that women are involved in livestock marketing and processing but mainly with aged female sheep and goats that are sacrificed or consumed locally. This could explain why group 3 respondents – mainly women – have tried to increase the number of older animals sold. Many producers from groups 1 and 2 tried during the last three years to sell animals with better conformation (around 60% for each group) compared to group 3. These findings corroborate the results in table 3 and figure 4 indicating a high importance of animal conformation and demand season in price setting for groups 1 and 2.

Conclusions

Three main factors were identified as affecting sheep and goat selling prices in Somaliland: health of the animal, body conformation and the demand season. These reflect the specifications of the Somali livestock market which is export-driven and highly affected by animal health disease outbreaks and by the Muslim Hajj pilgrimage season.

Among groups, differences exist linked to the market orientation of each group and its gender composition. Women seem to be more engaged in the local market where lower quality animals are exchanged. It seems that women have less information on factors affecting small ruminant export prices. A closer dissemination and capacity building work with women groups is essential to improve the overall quality of the animals produced and to involve women in export markets.

Results suggest that perceptions influence the type of efforts made to earn higher prices. One policy implication is that where the perceptions are not correct, rectifying this – probably through extension services – would lead farmers to focus in the right directions.

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