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Classification of low-resource livestock producers in the North West Province

I.V. Nsahlai# and A.T. Sedumedi
Animal and Poultry Science, School of Agricultural Sciences & Agribusiness,
University of Natal, P/Bag x 01, Scottsville, 3209
#Email:Nsahlaii@ansi.unp.ac.za

Introduction

Inadequate nutrition is generally blamed for the low production of livestock within the holdings of low resource producers. This could partly be due to uncontrolled management of communal lands which are severely degraded and largely unproductive (Duvel & Sebina, 1998). Although much research attention has been devoted to developing feeding strategies for improving the use of roughage diets, the extent to which these strategies are being implemented is unknown. In addition, very little is known of the livestock management practices inherent in this system. The aim of this study was to characterize and to group livestock farmers into recommendation domains (i.e group of farmers with similar practices) and verify whether the variations in livestock productivity among smallholder producer is associated with adoption of feeding management practices. The study attempted to determine what limits farmers from using supplementary feeding.

Materials and methods

A survey of livestock producers (n= 117) was conducted in the Taung district of the North West Province in order to identify target groups for livestock improvement among farming communities.The data recorded included livestock numbers and herd structure (young and mature), off-take, purchases of livestock, consumption of own stock, milk and purchase of red meat for home consumption. Data on feeding management and adoption of supplementary feeding practices were also recorded. Data were analysed using multi-variate statistics. The first step was to apply a variable reduction technique (ACECLUS) on livestock numbers and production indices in order to generate canonical variables, three of which were used in an hierarchical cluster analysis (Ward`s method) to decide on the appropriate number of clusters. The pseudo-F, pseudo-t^2 and the cubic clustering criterion were all unanimous for a 4-cluster solution which accounted for 70% of the variation. However the clusters so developed were further finely adjusted using a non–hierarchical procedure, FASCLUS (SAS, 1987). The validity of these clusters (recommendation domain) was established using canonical discriminant analysis on variables not used in clustering. Using Chi–square statistics, it was then finally established whether these groups of respondents differ in their management practices, perceived potential of supplementary feeding and livestock production constraints.

Results and Discussion

Cluster 1 contained 9.4 % of respondents, recorded the highest lamb holdings, sheep off-takes and also highest sheep production index (PI; Table 1). This group also recorded intermediate levels of kids, goat off-take and goat PI. This profile is typical of small ruminant producers. Cluster 2 contained 6.8 % of the respondents, is characterized by intermediate levels of lambs, sheep off-take and sheep PI. This profile is typical of producers engaged in moderate sheep farming. Cluster 3 comprised 73.5 % of the respondents, who have low levels of livestock, off-takes and consequently low production indices. This typifies a subsistence group of producers. Cluster 4 comprised 10.3 % of respondents who recorded the highest number of kids, goat off-take and goat PI, which is typical of goat producers. The number of calves, chicken off-take, cattle production index did not differ among the clusters. The following hypotheses were tested to validate the typology developed in table 1:

(a) Cluster 1 producers with highest number of lambs must have the highest levels of sheep value and are unlikely to purchase beef or mutton because part of sheep off-take is for home consumption
(b) Cluster 4 producers with highest kids holdings should have highest levels of goat value, and goat milk consumption and are unlikely to purchase beef, mutton or goat meat.

According to Hair *et al.* (1992) variables with loadings of absolute values greater than 0.3 are significant discriminants. The first two discriminant functions accounted for 96% of the variation, thus suggesting that a reasonable classification has been achieved. Function 1 loaded significantly for sheep value (0.95), donkey value (0.25), beef purchase (-0.29) and mouton purchase (-0.30) and group means for this function validates and

sufficiently differentiates small ruminant producers (Cluster 1) from moderate sheep producer (Cluster 2) and cluster 2 from Clusters 3 & 4. Function 2 loaded high for cattle (0.39), goat (0.36), pigs (0.51), goat milk consumption (0.35) and beef (-0.46) and chicken (0.26) purchases. The group means for this function distinguishes Cluster 4 from the rest, thus suggesting that goat holdings and the goat milk consumption are key features. These results validate the hypothesized trends of the producers, thus confirming the choice of a 4-cluster solution for this population of livestock producers.

Table 1. Cluster means of classification variable and group means of the first two discriminant functions for a 4-cluster solution of livestock producers.

	Cluster number					
Variable	1(n= 11)	2(n= 8)	3(n= 86)	4(n= 12)	F-ratio	Probability
Calves	4.0	2.0	3.0	5.0	0.85	0.467
Lambs	16.0	6.0	0.0	3.0	138.47	0.001
Kids	7.0	3.0	3.0	9.0	4.32	0.006
Beef off-take	1.0	0.0	1.0	3.0	3.17	0.027
Sheep off-take	8.0	6.0	0.0	1.0	81.62	0.001
Goat off-take	4.0	2.0	2.0	5.0	2.24	0.087
Chicken off-take	3.0	5.0	4.0	5.0	0.51	0.677
Cattle PI#	0.096	0.072	0.079	0.059	0.15	0.929
Sheep PI#	0.518	0.365	0.067	0.298	25.2	0.001
Goat PI#	0.238	0.083	0.127	0.300	3.53	0.017
Group means (centroids) following discriminant analysis						
Function 1	4.54	2.42	-0.84	0.26		
Function 2	-0.13	-0.63	-0.18	1.81		

Production indices were calculated as monetary value of young/monetary value of rest of herd.

Using Chi-square, it did not appear that the relative differences in the production indices of sheep and goats among the group of producers was associated with better feed management nor with producers knowledge of the importance of supplementary feeding. In fact only 9.4% of producers produce crop residues on-farm, 36.8% purchase crop residues and 36.8% purchase licks for livestock. Generally, 43.6, 31.6 and 23.9% of livestock producers perceived that supplementary feeding can improve condition, milk production, or offspring survival respectively. Most producers (90%) do not produce crop residues on-farm because of lack of arable land, while the lack of capital preclude them (42%) from farming and/or indulging in the purchase of supplements which are said to be expensive.

Conclusion

While the limited availability of arable land and poor capital standing may hamper the production of crop residues on-farm and purchase of supplements, it appears a large proportions of producers are still unaware of suitable supplementary feeding strategies. Given that just 24 and 32% of producers recognize that supplementary feeding could benefit the offspring and the milking cow, it is quite unlikely that supplements are used strategically for production. It is our contention that producer's awareness on this issue is needed, because it is only then that they can elect to sell some of the stock in order to purchase inputs (feeds, medication etc) to improve herd performance. Other options for improving productivity include improved herd structures and fencing as a solution to fodder flow. The approach used was relevant to classify producers into mutually exclusive groups.

References

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