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The influence of household characteristics on cattle off-take rates in the North West Province of South Africa

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Abstract

This paper evaluates the socio-economic characteristics of small-holder cattle producers in the North West Province and investigates the relationship between these characteristics with cattle off-take. A questionnaire aimed at capturing cross-sectional data on factors affecting cattle off-take for 2011 breeding season was administered through face-to-face interviews of 308 respondents.

Respondents were predominantly middle and old age males. Households headed by seniors (>65 years) tended to be larger than others. The majority (58%) of household heads regarded farming as their form of self-employment while only 15% had temporary or permanent employment outside agriculture. Most (82%) households relied on income from cattle followed by other livestock (55%) and social grants (47%). Female headed household relied on small businesses, which correlated positively with the sale of cattle and sheep. Households which depend on employment had less number of persons attending tertiary education and sold more cows. As expected, farmers sold more male animals (62.8%) than females mainly through auction sales. Unlike previous studies, our study shows that income from outside agriculture supplements cattle off-take. Households owning herds smaller than 11 head had higher overall herd off-take, as well as off-take for females than steers. Affiliation to and official position in community associations suppressed the cow sales but induce steer off-take. We conclude that financial burdens in households with smaller herds compel those households to sell potential breeding stock. We recommend the development of an animal recording system and that future interventions focus on the strengthening of women and community associations.

Key words: *small-holder cattle producers, socio-economic characteristics, social investment*

Introduction

Although cattle production forms an important part of the livelihoods strategy amongst agricultural households in South Africa, it is well known that these physical assets earn less economic returns amongst small-holder producers compared to the commercial sector. Recent population census shows that more than 600000 agricultural households own cattle

(Statistics South Africa 2013). Cattle in the hands of small-holder producers constitute 40% of the national herd (RMRDT 2008). The biggest concern is that the cattle off-take rate, which measures the amount of voluntary exits, remains low in the small-holder sector (Tapson 1990; RMDT 2008; Scholtz and Bester 2010) hence the need to determine the underlying socio-economic causes. According to Tchale (2009) both the age and education levels of household heads have a positive impact on efficiency. Meissner et al(2013) attribute the low off-take rates among small-holder producers to poor production efficiency. Otte and Chilonda (2002) reported high average herd performance levels for sub-Saharan Africa while Scholtz et al (2010) illustrate disparities in production efficiency between the South African commercial and small-holder sectors. Some studies have established a positive correlation between cattle off-take and demographic characteristic such as the age of household head and household size ((Nkhori 2004) while extraneous attributes such as employment (Baldwin et al 2008) and food aid (McPeak 2009) were found to suppress off-take rates. Dr Ruth Segomitsi Mompati (Dr RSM) District Municipality is South Africa's largest beef producing district. Thus, investigation of off-take patterns of the District may provide a useful insight into challenges of the small-holder sector. The objective of this paper was to describe the socio-economic characteristics of small-holder cattle producers in the North West Province and investigate the relationship between these characteristics and herd dynamics and cattle off-take.

Materials and methods

Data collection

This study was conducted in the Dr Ruth Segomotsi Mompati (RSM) District Municipality of the North West Province. A random sample of 308 cattle farmers was selected from a list of 1700 from the District Department of Agriculture and Rural Development. Three wards of Taung North (25%), Morokweng (31%) and Ganyesa (44%) were used as strata to draw proportionate samples. A questionnaire aimed at capturing cross-sectional data on factors affecting cattle off-take for 2011 breeding season was developed and administered through face to face interviews with respondents. The instrument containing 73 questions ranging from demographic data to production data including sources of information and sales was administered between May and July 2012. Off-take rate was calculated as number of sales during 2011/ average of opening and closing herd sizes during 2011 x 100. For this purpose, animals were categorised as bull, ox, cow, heifer, bullock and steer.

Data analysis

Data were analysed using IBM SPSS statistics 22 (2013). Descriptive statistics were computed using frequencies and means to determine patterns between variables. Ranking scales were transformed into dummy variables to enable statistical tests. Males were coded 0 while females were coded 1. Herd sizes were classified according to categories suggested by Tapson (1990) where herds of less than 10 were regarded as small. The GLM multivariate analysis was performed to test effect of farming area and farm level variables on herd mortality and off-take rates. Means were separated using least significant differences (LSD) tests. Correlation analysis was performed to measure associations between demographic characteristics and herd off-take.

Results and discussions

Household characteristics

The majority (76%) of households were headed by men even though Taung had the highest (46%) of female headed households than other extension wards (Table 1). The high proportion of male farmers in the study area agrees with findings from other parts of the region (Kapimbi and Teweldemedhin 2012; Chirwa and Matita 2012) showing that males constituted more than 80% of farmers. The average age of household heads was 57 ranging from 24 to 86 years with household heads from Taung being older than those from other extension wards. However, all extension wards had similar household sizes, number of economically active members as well the years of schooling for the household head. The average household size was five ranging between one and 15 members with three economically active members on average ranging from one to 14. About 79% of household heads attended school for between one and 17 years with an average attendance of 7.6 years. This education level suggests that these farmers completed primary school and are therefore literate (Huebler 2006).

Table 1. Distribution of households by extension wards

Parameter	Extension ward				SE	*p*
	Taung North	Ganyesa	Morokweng	Mean		
Number of farmers	77	135	96	102	0.04	
Household size	4.8	5.2	4.5	4.9	0.21	0.58
Average Age of head	59.2[a]	56.3[b]	50.8[b]	56.8	0.97	0.002
Percent female heads	46.70[a]	21.48[b]	9.37[b]	24	0.024	0.001
Economically active members	2.46	3.04	3.06	2.99	0.30	0.63
Years of schooling	7.6	7.4	8.3	7.7	0.34	0.79

Means in the same row without common letters are different at P<0.05

Table 2 shows that the production system is dominated by middle aged farmers (46%) of between 45 and 65 years of age, followed by seniors (34%). Similar age distributions of household heads have been reported in other parts of sub-Saharan Africa such as Malawi (Chirwa and Matita 2012) and Nigeria (Adensehinwa et al 2004), which confirms the low participation rate of the youth in agriculture. Household headed by seniors (>65 years) were larger than those whose heads were in younger age categories. These extended families provide a context that larger households could be a function of social dynamics associated with migrant labour and mortality among young parents, which leave seniors with the burden of multigenerational guardianship. Although seniors had the least years of schooling (5.15) than other age categories, households headed by seniors tended to have more members enrolled for tertiary education. This result suggests that there is a high level of awareness about the importance of education and skills development as well as their potential impact on economic growth.

Table 2. Distribution of households by age of the head

Parameter	Age category						
	<36	36-44	45-65	>65	Mean	SE	*p*
Frequency	26	32	138	102			
% Male	77.00	90.62	69.57	78.43	76.00		0.44
Household size	4.20 [a]	4.85 [a]	5.73 [a]	6.73 [b]	5.92	0.67	0.05

Years schooling	10.80[ab]	11.39[a]	7.89[b]	5.15[c]	7.6	0.80	0.01
Persons basic ed.	1.40 [a]	3.15 [ab]	3.79 [b]	3.90 [b]	3.65	0.64	0.07
Persons tertiary ed.	1.20 [ab]	1.07 [a]	1.66 [b]	2.00 [b]	1.69	0.66	0.01
Total school	2.60[a]	4.23[ab]	5.45[bc]	5.90[c]	5.34	0.68	0.01
Herd size	31.40	39.62	42.42	45.18	35	1.74	0.81

Means in the same row without common letters are different at P<0.05

Employment

Figure 1 shows that the majority (58%) of household heads regarded farming as their form of self-employment while only 15% had temporary or permanent employment outside agriculture, and 24% regarded themselves as unemployed. The public service was the main source of employment accounting for 60% compared to 24% for mining. The attitude to regard agriculture as a form of employment is consistent with finding that 69% of households used members of the household to herd cattle, 75% of whom were household heads. This indicates that cattle plays an important role in livelihoods in the study area.

Figure 1. Employment status of household heads

Sources of income

The role of agriculture as a form of employment was confirmed by a high reliance on cattle in the study area. Figure 2 shows that cattle production was the major source of income for most households (82%) followed by small stock (55%) while crop production played the least role in income provision, accounting for only 11%. This is not surprising because only 4.5% of households had access to arable land, 64% of which was cultivated in 2011. Social grants were a source of income for 47% of households compared to 16% and 6% for remittance and small businesses, respectively. The high reliance on social grants could be attributed to the high proportion of seniors among household heads.

Figure 2. Sources of income of household heads

Herd composition

The average herd size was 35 ranging from one to 169 with smaller herds found in Taung North. The average calving rate was 55% ranging from 5.6% to 100% whilst herd mortality ranged from 0.5% to 94.8% with an average of 10% (Table 3). Herd off-take rates ranged from 2.7% to 66.7% with an average of 15%. Small stock flocks ranged between one and 181 with an average of 40 animals per flock. Most households (71%) owned chicken ranging between one and 200 with an average flock of 17 birds. More households owned donkeys than horses, which could signify the role of donkeys as a source of drought power. The average number of horse was 5.07 ranging from one to 32 while the number of donkeys ranged from one to 20 with an average of 5.18. The prevalence of horses in the study area may be attributed to the use of these animals for herding. However, pigs play a minimal role in the study area with only 3.6% of households owning between one and 14 pigs.

Table 3. Average herd sizes for small-holder cattle producers in three extension ward

Extension ward	Animal category					
	Cattle	Small stock	Chicken	Pigs	Horses	Donkeys
Taung North	15.90	15.81	21.18	5.50	5.60	3.50
	(77)	(42)	(50)	(4)	(5)	(10)
Ganyesa	42.70	43.02	17.42	4.80	5.49	5.58
Morokweng	(135)	(124)	(103)	(5)	(78)	(89)
	42.60	49.06	14.24	3.00	4.55	5.16
Total	(96)	(92)	(66)	(2)	(66)	(75)
SD	35.00	40.75	17.32	4.73	5.07	5.18
	(308)	(258)	(219)	(11)	(149)	(174)
	1.81	2.05	0.37	1.28	0.37	0.21

Values in brackets represent the number of farmers

Market channels

Previous studies in South Africa showed market participation rate of between 21% (Tapson 1990) and 64% (Randela 2003). Our study showed that 82% of respondents sold their cattle in 2011 with an average herd off-take rate of 15% ranging between 2.7% and 66.7%. Table 4 shows that males constituted the majority (62.8%) of cattle sales in the study area. Most (57%) animals were sold through auction sales whilst direct sales to feedlots was minimal (4.9%). Despite being perceived as providing better prices by the majority (62%) of farmers than auction sales (38%), only 16.7% of the cattle in the study area were sold out of hand. The high price associated out of hand sales may be due to ability to negotiate prices between buyers and sellers. However, the low proportion of sales could be a result of the unreliability of this market. Most sales in this category were of females slaughtered for ceremonies such funerals. Our study also shows that a significant proportion of animals (21.2%) was sold through other sources such as speculators. Most (87.8%) respondents regarded the price offered by speculators to be poor. The relatively higher sales through speculators suggest that farmers in the study area could be selling cattle to address urgent financial needs. This hardship could be addressed by improving auction sales facilities in the study area.

Table 4. Market channels for disposing of different categories of animals in Dr RSM District Municipality

	Auction	Feedlot	Out of hand	Other	Percent
Bulls	54	8	14	12	9.9
Oxen	108	2	2	40	17.2
Cows	130	22	54	38	27.5
Heifers	34	8	28	12	9.2
Bullocks	48	2	28	8	9.7
Steers	132	2	22	78	26.5
Total	506	44	148	188	100

Income and demography

Table 5 presents the correlation results between demographic attributes of households and sources of income. Results reveal distinct livelihoods strategies between male and female

headed households showing a positive correlation between women and employment (r= 0.248), social grants (r= 0.169) as well as small businesses (r= 0.185). As expected older household heads depended less on employment (r=259) than remittance (r=223) and social grants (r=510). Furthermore, as shown in Table 2 that older household head tend to have more members, larger household also depended more on remittances (r=0.221) than employment (r=0.187). On the other hand, households who depended more on income from crops (r=0.199) than employment (r=0.189) had more members enrolled for higher education. This suggests that households who depend on income from employment tend to be less capable of enrolling their members at institutions of higher learning. Household heads who held office in community associations also depended more on crop income (0.386) than employment (0.596), social grants (r=0.275) and small business (0.211). This result supports observations by (Pica-Ciamarra et al. 2011) indicating that small-scale farmers in Vietnam tend to have multiple sources of income including farm and non-farm income.

Table 5. Correlation between demographic attributes and sources of income

Herd size and Income sources	Demographic attributes				
	Gender	**Age of household head**	**Household size**	**Persons in tertiary education**	**Affiliation**
Employment	.248**	-.259**	-.187**	-.189*	-.596**
Cattle	-.015	-.066	.023	.077	.104
Crops	-.068	-.035	.093	.199*	.386**
Remittances	.051	.223**	.221**	.145	-.005
Social grants	.169**	.510**	.115	.115	-.275**
Small business	.185**	-.056	-.111	-.085	-.211*

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed*

Influence of socio-economic attributes on off-take rates

Previous studies by Idiong (2007) and Tchale (2009) found no significant effect of the gender of household head on efficiency of small-holder agriculture. In contrast, our study shows that male headed households tend to achieve higher calving rates (r=0.202) and sold more steers than their female counterparts (r=0.184). Scholtz and Bester (2010) estimated calving rate for small-holder producers between 30% and 48%, percent adult females 25-49% and mortality 5.5-35%. With the exception of calving rate where men achieved significantly higher calving rates (56.88%) than women (47.53%), our study found no significant gender differences in herd performance parameters. This means that women farmers are as efficient as male farmers and should be afforded equal opportunities to participate in the cattle industry.

Dependence on income from cattle showed a high awareness for herd management. These households sold more oxen (r=0.284), steers (r=0.123) and overall number of animals (r=0.159) but withheld bulls (r=0.184). This result suggests that these households withhold some stock for breeding and replacement purposes.

On the other hand, there was a negative correlation between calving rate and dependence on income from employment (r=0.426) social grants (r=0.230) and small business (r=0.132). Farmers who depended on income from employment withheld steers (r=0.220) but sold more cows (r=0.119), bullocks (r=0.187), overall herd (r=0.129) and sheep (r=0.231). Dependence on social grants was also positively correlated with the sale of oxen (r=0.214) but negatively correlated with the sale of steers (r=0.195). Our results suggest that farmers who experience low calving rates tend to adopt a long weaner system where steers are withheld and sold as

oxen. This implies that two production systems, one focusing on weaner production and the other focusing on oxen are in place in the study area. Furthermore, small businesses also induced the sale of oxen (r=0.231), bullocks (r=0.162), overall herd off-take (r=0.228) as well as the sale of sheep (r=0.292). Our results on small businesses contrast those by Colvin (1985) and Baldwin et al (2008) who reported a negative correlation between alternative sources of income and off-take as well as suppressive effect of food aid reported by McPeack (2004). Our findings suggest that small businesses complement rather than substitute cattle production, in the study area.

From a herd dynamics point of view, households owning smaller herds of less than 11 sold more cows (r=0.207), heifers (r=0.135), bullocks (r=0.182) and overall herd (r=0.254) than steers (r=0.179). The sale of sheep also appears to supplement incomes for these households (r=0.211). The tendency of households with small herds to dispose of cows and heifers has implications for livestock development in the study area. Although we did not obtain empirical evidence regarding the culling criteria to establish reasons for the high sale of females, it is obvious that this action will suppress the growth of herd sizes among small-herds. This calls for the introduction of more efficient culling criteria in the study area such herd improvement and performance recording scheme.

Furthermore, institutional arrangements tended to play an important role in the study area. Only 22% of respondents reported to be affiliated to community associations. Household heads who were affiliated to associations sold less cows (r=0.217) than steers (r=0.384).This apparent willingness by households affiliated to some of institutions to sell livestock suggests the potential influence of the institutions on farmer opinion. This implies that these institutions could be used as part of the strategy to improve cattle off-take in the study area.

Table 6. Influence of socio-economic attributes on off-take rates

Herd dynamics	Socio-economic attributed						
	Gender	**Herd size**	**Employment**	**Cattle income**	**Social grant**	**Small business**	**Affiliation**
Calving rate	-.151*	-.234**	-.126*	-.117	-.230**	-.132*	-.011
Bull sale	.016	.061	-.047	-.154**	-.081	-.051	.052
Ox sale	.067	-.059	.071	.284**	.214**	.231**	-.048
Cow sale	.069	-.207**	.119*	-.091	-.012	.034	-.217*
Heifer sale	.062	-.135*	.043	.004	-.044	-.094	-.167
Bullock sale	.042	-.182**	.187**	-.082	-.043	.162**	-.048
Steer sale	-.184**	.179**	-.220**	.123*	-.195**	-.001	.354**
Herd off-take	.058	-.254**	.129*	.159**	.017	.228**	-.149
Sheep sale	.067	-.211*	.231*	-.086	-.088	.292**	-.096

***. Correlation is significant at the 0.01 level (2-tailed).*

**. Correlation is significant at the 0.05 level (2-tailed)*

Conclusions

- Our study has provided an analysis of demographic characteristics of small-holder cattle producers in Dr Ruth Segomotsi Mompati District Municipality. It confirms previous findings in the region showing male dominance and low youth participation rate. Women farmers tended to own smaller herds, which compelled them to engage in other forms of livelihoods such as small businesses as a complementary strategy. An encouraging finding was on the

tendency of small business dependent households, a forte for women, showing a higher level of efficiency, which suggests the need for extended opportunities for women participation in the industry.

- The inclination of women and households owning smaller herds to dispose of potential breeding stock such as cows and heifers implies that these categories of farmers may be selling under pressure. This might be corroborated by the high presence of speculator market in the study area, which suggests distressed marketing. This happens despite the supplementary role of other income sources. We conclude that there is a need for a structured culling plan based on animal recording for the study area to promote growth among small herds. Furthermore, efforts should be focused on improving auction sales facilities with a view to improving cattle price for small-holder farmers.

- Finally, the correlation between affiliation and off-take rates indicates that community organisations could play an important role in farmer mobilization for change. It is recommended that future farmer development strategies focus on women empowerment with a view to growing herd sizes among this section of the population. Community organisations should be utilised as a platform to facilitate cattle and livestock marketing.

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