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Can Livestock Cooperatives Improve Cattle Marketing?

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ABSTRACT

One strategy local farmers can use for possibly adding value to cattle is to cooperate with other market participants. This cooperation is with other farmers and firms at different points in the marketing channel. The study aimed at determining the contribution of livestock marketing cooperatives to improving cattle marketing in Oshikoto and Ohangwena regions of Namibia. The study employed a mixed method research design where both qualitative and quantitative data were used. A representative sample of communal farmers was randomly selected among those that received services from livestock marketing cooperatives in Oshikoto and Ohangwena regions. Primary data was collected through use of a structured questionnaire in face-to-face interviews. The study sought to test hypotheses that farmers preferred cooperatives as sustainable marketing channels compared to other channels; Cooperatives brought about more benefits to farmers in the study area and that auctions organised by livestock marketing cooperatives can be substituted by direct sale of inspected livestock. The study employed descriptive statistics and binary logistic regression. The study found that majority of the farmers indeed preferred livestock marketing cooperatives as a marketing channel in both regions, therefore, accepting the alternative hypothesis. Most respondents from both regions indicated that livestock cooperatives would contribute to growth in the livestock industry, which is a benefit for communal livestock farmers. The livestock industry would grow because more farmers will have better access to markets and be able to sell their livestock. In addition, since cooperatives have mentorship programmes, farmers would be encouraged to keep their livestock in good condition and benefit from a standardized pricing system. This study, therefore, recommends that livestock marketing cooperatives should conduct robust mobilisation activities for farmers to understand potential benefits of livestock marketing cooperatives for them to participate fully in the organised auctions.

Keywords: Communal farmer, Cooperative, Livestock, Marketing, Namibia, Off-take

1. INTRODUCTION

Namibia is a semi-arid country, which is wealthy of natural pastures, comprising 37% of the land area, suited for extensive livestock ranching (IECN, 2011). Agriculture is the most viable livelihood option for rural communities of Namibia situated in the Northern Communal Areas (NCAs). According to Mwoombola (2017), the livelihood of most households in the NCA's partly depends on millet as a staple food. Livestock farming, comprising of cattle, goats and poultry management, forms part of the most important rural livelihood source (Meat Board of Namibia, 2012). Customarily, in the NCAs, large herds of cattle are kept as a store of value or symbol of wealth by many communal farmers. In general, livestock is only sold in times of dire need for cash. This is one of the key reasons why livestock numbers have increased continuously in the NCAs of Namibia (Ministry of Agriculture, Water and Forestry, 2015).

Lack of effective livestock marketing institutions has been identified as a limiting factor to growth in the livestock sector of the NCAs. Lack of a suitable and vibrant livestock marketing value chain remains a challenge to the socio-economic development of poor communities in the NCAs (Agra PSD, 2014). As stated by Altman (2009), agriculture cannot be possible without cooperation from farmers. The Namibian National Cooperative Policy (1992) enabled economic, legal and institutional surroundings that favoured the development and growth of all kinds of cooperatives in Namibia. The Namibian Cooperatives Act (No. 23 of 1996) provided the legal means for individuals to organize legal cooperative businesses. The law mandated cooperative development under the auspices of the Ministry of Agriculture, Water and Forestry/Division of Cooperative Development (MAWF/DCD), and the cooperative business structure could be used beyond agriculture and rural development. MAWF/DCD showed a total of 127 cooperatives, seven (7) fully registered cooperatives and one hundred and twenty (120) provisionally registered (MAWF, 2006).

Given the legal and policy framework in Namibia, a number of livestock development projects have been implemented in the past. As opposed to commercial areas, all existing farmers' organizations in the NCAs were established without external assistance, business or operational strategies (Agra PSD, 2014). No appropriate and sustainable marketing institutions were

established to promote the livestock sector (Kruger Bertus, 2012). This led to failed or ineffective execution of livestock marketing roles and responsibilities.

Cattle off-take in the NCAs is low. A recent study commissioned by the Millennium Challenge Account stated an off-take rate of 12.4%, 75% of which was cattle taken-off the herd for weddings and funerals (Agra PSD, 2014). On the other hand, the Innovation for Poverty Action through a Community Based Rangeland and Livestock Marketing (CBRLM) project baseline survey (2012) stated a total off-take rate of 11% on average for the NCAs. The marketing component of the CBRLM project had a deliverable of improving off-take at the Grazing Areas (GA) level. Throughout the project implementation phase, the GA farmers were consistently encouraged to market their livestock.

The CBRLM project established Livestock Marketing Cooperatives in five (5) regions of the country including Oshikoto and Ohangwena. The concept adopted for the cooperatives was first implemented by Zakumuka Producer Cooperative in Kunene Region, which was independently established in 2011 by the farmers. Oshikoto and Ohangwena livestock marketing cooperatives were established later in 2012 and became fully operational in March 2013. Support of such livestock marketing bodies would institutionalize the CBRLM auction activities, which started in 2011.

These livestock marketing cooperatives were to serve all livestock marketing needs of the farmers in the regions. There was an export abattoir in Oshakati which was managed by MeatCo and was closed in 2015 due to low throughput, averaging 10,000 cattle slaughtered per year. Few NCA farmers regularly marketed cattle at the abattoir and those who sold cattle did so mainly between March and September. However, south of the veterinary cordon fence (sVCF), the livestock marketing pattern is much more widespread throughout the year. This pattern has resulted in the sustainability of abattoirs in the southern part of the country. Over 50% of the formal market is supplied by meat and cattle from sVCF and increasingly, the traders who sell to the informal markets nVCF also buy their cattle in the south (Duvel & Stephanus, 2000). In addition, consumers in the NCAs nowadays tend to prefer livestock and livestock products from sVCF.

The **NCA**s of Namibia contribute comparatively little to the agricultural Gross Domestic Product (agGDP), despite the high livestock population in these areas. However, 76% of the total agGDP is predominately generated by the livestock sector. Only 6% of this comes from the communal areas. Nowadays, there are more cattle in the NCAs than the commercial farming areas **sVCF**. Despite this, small numbers are taken to the market and the contribution to the agGDP remains minimal. This is mainly because of the low off-take rate particularly in the NCAs where it is only 1.2% (Meat Board of Namibia, 2012) or up to 3.7% (Innovations for Poverty Action, 2011) compared to 25% in the commercial areas.

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The other challenge associated with lack of marketing institutions is that Namibia is divided into three (3) Foot and Mouth Disease (FMD) control zones, namely, the

- (i) **Infected zone:** The almost 140 000 cattle in this zone/area are vaccinated tri-annually using trivalent FMD vaccine; SAT 1, 2, and 3 (Southern African Territories serotypes 1, 2 and 3). The area has resident population of FMD infected free roaming buffaloes. This zone is mainly restricted to the Zambezi region.
- (ii) **Protection zone:** The cattle population in this zone is 1.33 million. There are no resident buffaloes. The zone is free of FMD without vaccination. Much of this protection zone has been historically free of FMD (about 40 years) until the 2015/2016 FMD cases which were reported in Ohangwena region. In this zone routine FMD surveillance is done and this affects marketing particularly on the price realized by farmers because these livestock can only be marketed within the NCA's. This zone runs from Kunene, the 4 'O' regions, Kavango West and East regions.
- (iii) **Free zone:** This zone is FMD free and there is no vaccination. A cordon fence separates the free zone from the protection zone. This zone hosts some 1.43 million cattle. It includes all regions **sVCF**.

The implications of zoning are that the regions in which this study is being carried out fall in the Protection Zone. Therefore, no cloven hoofed animals are allowed from the **nVCF** to the **sVCF** except for sheep and goats that undergo a 90 day quarantine in a government quarantine facility **nVCF** and another 90 days in a government quarantine facility **sVCF**. And no beef may go **sVCF** from the Protection Zone unless it has been de-boned, frozen to minus 21°C for more than 21 days,

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vacuum packed and is from slaughtered cattle whose site of origin had FMD surveillance 21 days post slaughter. This mandatory processing of beef results in shrinkage of livestock prices and reduces farmers' propensity to market; concomitantly decreasing off-take.

Livestock marketing cooperatives are official procedures of farmer's collective action used mainly for purposes of marketing, purchase and production of farm inputs. The main motive behind founding a cooperative is to maximise production and incomes. Such cooperatives help farmers have the bargaining power in order to access funding, agricultural inputs, information and the market in which goods are exchanged. Social relations that permit certain individuals to accomplish their intended objectives that they could not achieve themselves are created by cooperatives. For instance, with cooperatives, farmers profit more from economies of scale by reducing their costs of purchasing implements or acquisition of services such as storage facilities and transportation. Agricultural cooperatives also empower farmers to expand on their product, quality of facility and decrease hazards. The cooperative also empowers members economically and socially through an involvement in the decision-making processes, which is seem to supplement rural occupation chances or educate them and warn them to become vigilant to monetary and conservational tremors.

Having a decentralized livestock market and updated information that are well disseminated to communal farmers by the state and all stakeholders helps to uplift the accessibility of communal farmers to formal cattle markets. The more appropriate the information on marketing, the stronger the farmer's ability to negotiate during trading.

This study, therefore, sought to determine the contribution of livestock marketing cooperatives to cattle marketing and off-take in Ohangwena and Oshikoto regions of Namibia. The specific objectives were to assess farmers' perceptions about livestock marketing cooperatives, to evaluate the benefits that cooperatives brought to farmers and to the livestock marketing industry, and to recommend alternative livestock marketing channels in order to improve livestock industry in the Northern Communal Areas.

To address these objectives, the study tested hypotheses that farmers preferred cooperatives as sustainable marketing channels compared to other channels, that cooperatives brought more

benefits to farmers from Oshikoto and Ohangwena regions and that auctions organised by livestock marketing cooperatives can be alternatively substituted by direct sale of inspected livestock.

2. MATERIAL AND METHODS

2.1 Description of the study area

The study areas are Oshikoto and Ohangwena regions in the northern part of Namibia. **Oshikoto** is one of the fourteen regions of Namibia, which measures about 38,685 km² and has a population of 181,600 people (Agency, 2011). There are 115 cooperative members registered in the region. The region has two (2) main auction kraals, namely, Onyuulaye and Omuntele. According to the latest official statistics from the Directorate of Veterinary Services in the Ministry of Agriculture, Water and Forestry (2016), Oshikoto region has a total number of about 292 000 cattle.

Ohangwena is one of the fourteen regions of Namibia, measuring about 10,706 km² with a population of 245,100 inhabitants (Agency, 2011). Although the region depends on rain fed agriculture, other crops can be established under intensive cultivation. There are 155 cooperative members registered in the region. There are two (2) main auction kraals in Ohangwena, namely, Uushake and Onghalulu. Ohangwena region has about 240 000 cattle (Meat Board of Namibia, 2016).

2.2 Sampling and data collection procedure

The sampling frame was all communal farmers who received services from the cooperatives and who regularly sold through cooperative-organized auctions at the auction kraals in each region. The sample chosen for the case study is a total number of 60 farmers, 30 farmers were selected from Oshikoto and other 30 farmers from Ohangwena region. Simple random sampling was used for sample selection. With this sampling method, every individual in the sample has equal chance of being selected (Easton, 1997).

The study employed a mixed method design, using both qualitative and quantitative data as recommended for strategic research (Ormrod, 2005; Denscombe, 2014). The study made use of

primary and secondary data. Face-to-face interviews were used for data collection of primary data using a structured questionnaire with both open and close-ended questions. The researcher used questionnaires to allow the participants to feel a greater sense of anonymity, and were more likely to provide honest answers. The questionnaire consisted of two sections covering demographic and Livestock Marketing Cooperatives related data.

2.3 Analytical techniques

Data analysis procedure for quantitative and qualitative data involved coding and assigning numerical values as well as computer based analysis. The study used both descriptive statistics and empirical data to make statistical inferences. Descriptive statistics was run to determine the distributions. The study also used binary logistic regression to explain the relationship between the dependent variable (livestock marketing cooperatives) and the three independent variables (Marketing channel, improve and benefits to farmers). Binary logistic regression is a technique where the dependent variable is binary (dichotomous) and can be explained by several independent variables that can be either continuous or categorical. In a binary logistic regression, the likelihood outcome is always expressed as odds. The outcome (odds) is transformed into log odds logits, which is called natural log of the odds (Brown, 2014).

The binary regression equation for this study was:

$$\begin{aligned} \text{Logit (Livestock Marketing Cooperatives)} \\ = \alpha + \beta_1(\text{Marketing Channel}) + \beta_2(\text{Improve}) + \beta_3(\text{Benefit}) \end{aligned}$$

The results were presented in tables and figures.

3 RESULTS AND DISCUSSION

3.1 Descriptive statistics

Descriptive statistics for a set of demographic features including age, gender, marital status and education of farmers from Oshikoto and Ohangwena regions in the NCAs were run to determine distribution.

3.1.1 Age

Age of participant is a vital feature used to understand opinions on a specific situation. Literally, the older the individual, the more the experience in farming.

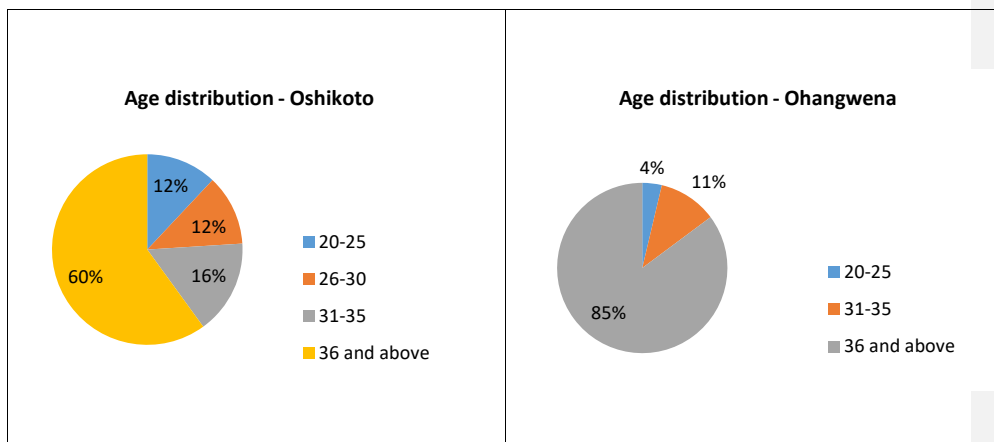


Figure 3.1: Distribution of respondents by age

This question aimed to discover the various age groups of the different respondents in the two regions. The results of the findings are presented in the Figure 4.1. The figure shows that 60% of the respondents from Oshikoto Region were between the ages of 36 years and above, 16% of respondents were in the age group of 31 and 35 years. In addition, 12% of the respondents were in the ages of 20 to 25 years and 26 to 30 years old respectively. To be more precise, large numbers of respondents are farmers of 36 years old and above in the sample. However, due to the small sample size, the researcher cannot generalise that there are more farmers in the region who are above 36 years.

The second figure shows that 85% of the respondents from Ohangwena region were between the ages of 36 years and above, 11% of respondents were between the age group of 31 and 35 years. In addition, only 4% of the respondents were between the ages of 20 to 25 years. This finding coincides with the results by MAWF (2018) and USDA (2007), who found that the fastest growing group of farm operators are those 65 years and over.

3.1.2 Gender

For this study, gender was seen as another significant variable in order to determine gender balance or imbalance regarding the agricultural situation. Hence, gender was examined and data associated to gender of the participants is presented in the Figure 3.2.

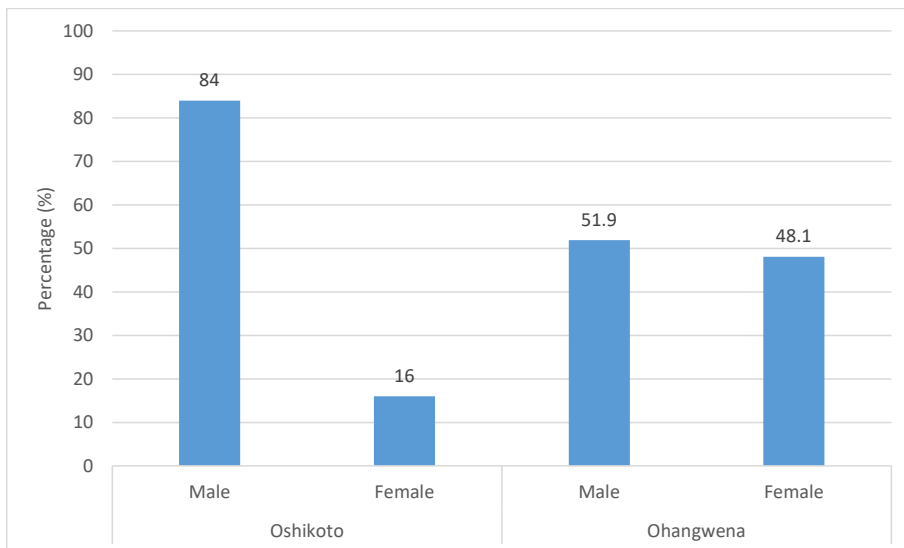


Figure 3.2: Distribution of respondents by gender

The results in Table 4.1 show that 84% of the respondents were male and 16% were female from Oshikoto region. For Ohangwena region, 51.9% of the respondents were male and 48.1% were female. In both regions, the majority of the respondents were male and this can be attributed to cultural livestock ownership trends. This concurs with (IECN, 2011) which indicated that male are the designated holders of farms and not female.

3.1.3 Marital status

The following figure displays the marital status findings for the two regions as stipulated in Figure 3.3.

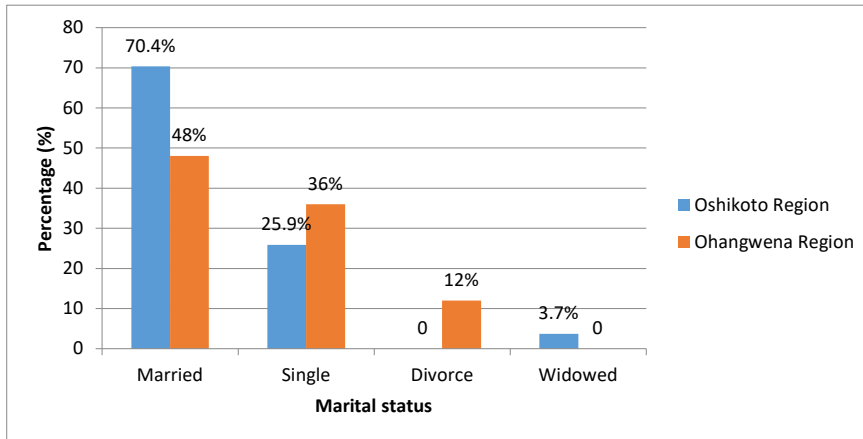


Figure 3.3: Distribution of respondents by marital status

The highest marital status amongst the respondents was married, where Oshikoto region had 70% and Ohangwena region had 48%. Furthermore, 36% and 26% of the respondents from Oshikoto and Ohangwena regions, respectively, were single.

3.1.4 Level of education

The way of looking and understanding an agricultural situation and person’s attitude is affected by the level of education. In addition, feedback from an individual is probably determined by his/her educational status, it therefore becomes authoritative to identify the educational background of the respondents. The statistics relating to education is demonstrated in Figure 3.4 as investigated by the researcher in the variable ‘Educational level’.

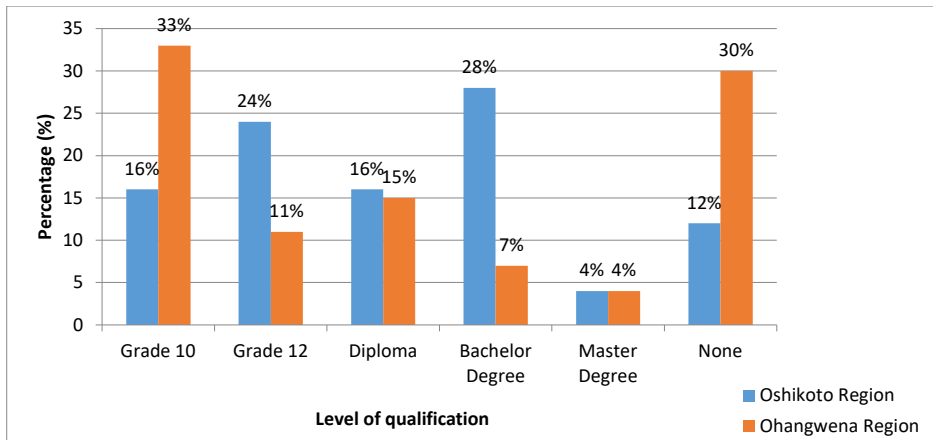


Figure 3.4: Distribution of respondents by level of education

Figure 4.3 shows that more respondents (33%) from Ohangwena region were educated up to grade 10 compared to 16% of respondents from Oshikoto Region. However, about 24% of the respondents from Oshikoto region were educated up to grade 12 as compared to 11% of the respondents from Ohangwena region. The number of respondents who had a diploma or bachelor degree was high (44%) for Oshikoto region compared to 22% respondents from Ohangwena region. Farmers with no educational qualification were high (30%) for Ohangwena region compared to 12% for Oshikoto region.

From Figure 3.4, it can be concluded that majority of the participants were academically advanced. Exposure to education according to Julius (2013) will strengthen the farmer's ability to process and make use of relevant information on the adoption of improved agricultural technologies.

3.1.5 Employment status

Employment status is also an important variable for this study in order to determine respondents that are fulltime on farming and those that are partly in farming.

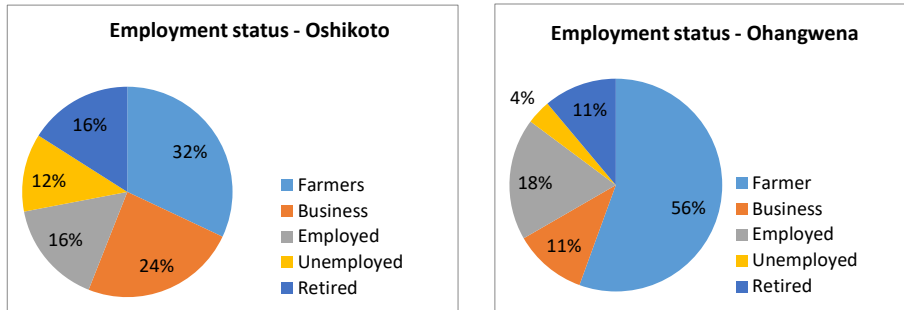


Figure 3.5: Distribution of respondents by employment status

The Figure 3.5 shows the findings of the employment status of the respondents. The first chart illustrating the results for Oshikoto region shows that 32% of respondents are farmers, 24% are in business and only 12% of the respondents are unemployed. Results for Ohangwena region show that 56% of the respondents are farmers and 18% are employed. In addition, respondents who reported to be retired and those that are in business comprises of 11% each.

3.2 Empirical results

3.2.1 Objective 1

To achieve this objective, to assess farmer's views on livestock cooperatives: the study determined if farmers prefer cooperatives as sustainable marketing channels or whether they had other preferred marketing channels. The hypothesis that was tested by this objective was:

H_1 : Farmers prefer cooperatives as sustainable marketing channels compared to other channels.

Table 3.2: Preference of cooperatives as sustainable marketing channels

Prefer cooperatives as sustainable marketing channels	Oshikoto region (n=25)	Ohangwena region (n=27)
Yes	84%	92.6%
No	16%	7.4%

Findings indicate that majority of the farmers’ preferred livestock cooperatives. This led the researcher to reject the null hypothesis and conclude that about 93% of the respondents showed that they prefer cooperatives as a marketing channel in Ohangwena region and 84% of the respondents from Oshikoto region prefer livestock cooperatives as a marketing channel. This means, out of 52 farmers interviewed for the two regions, 46 (88.5%) farmers indicated that they preferred livestock cooperative as a sustainable marketing channel and only 6 (11.5%) farmers did not prefer cooperatives.

Table 3.3: Alternative marketing channels in Oshikoto and Ohangwana regions

Other marketing channels	Oshikoto region (n=25)	Ohangwana region (n=27)
Open markets	28%	51.9%
Speculators	64%	7.4%
Traditional ceremonies	8%	40.7%

The study also aimed to determine whether farmers have other preferred marketing channels that can substitute livestock cooperatives. Although majority of respondents indicated that they prefer livestock cooperative, 64% of the respondents from Oshikoto region indicated that they would choose speculators to substitute livestock cooperative and 28% indicated open markets to substitute livestock cooperatives as a marketing channel. For Ohangwena region, majority (51.9%) indicated Open markets to substitute livestock cooperatives. About 41% indicated traditional ceremonies to substitute livestock cooperatives. Traditional ceremonies accounted for 8% in Oshikoto region, which was the lowest, compared to other marketing channels and Ohangwena region was speculators with 7.4%.

Table 3.4: Distance to the nearest cooperative

Distance to the nearest cooperative	Oshikoto region (n=25)	Ohangwana region (n=27)
1-5 km	12%	3.7%
6-10 km	32%	18.5%

11-15 km	0%	22.2%
16-20 km	56%	55.6%

The respondents were requested to point out the distance to the nearest cooperative from their residences. For both regions, it shows that the cooperatives are far (16-20km) away from the farmers' area of residence. About 56% of the respondents indicated that they are 16 – 20 km away from cooperatives for both Oshikoto and Ohangwena region, respectively. Only 12% of the respondents indicated that they are closer to the cooperative at 1-5 km and others (32%) said the nearest cooperative is 6-10 km from Oshikoto region. In Ohangwena region, 22.2% said the nearest cooperative is 11-15 km and only about 4% showed that they are 1-5 km away from the nearest cooperative.

Respondents were asked on how they rated the cooperative management structure within their area (Table 3.5). In Oshikoto region, (56%) stated that the cooperative management structure was satisfactory, 16% indicated very good and fair. Only 12% indicated that the cooperative management structure was poor in their areas.

Table 3.5: Rating cooperative management structure and contribution in Oshikoto and Ohangwena regions

		Poor	Fair	Satisfactory	Very Good	Excellent
Cooperative management structure	Oshikoto	12%	16%	56%	16%	0
	Ohangwena	0	7.4%	37%	55.6%	0
Contribution of cooperative to livestock off-take in the area	Oshikoto	4%	24%	44%	24%	4%
	Ohangwena	0	18.5%	33.3%	48.1%	0

Respondents were also asked on how they rated the contribution of cooperatives to livestock off-take in Oshikoto region. Many respondents (44%) said the contribution of the cooperative to livestock off-taking is satisfactory in their areas. Only 4% of the respondents rated the contribution as excellent and 24% said it was very good.

Respondents from Ohangwena region were also asked on how they rated the cooperative management structure within their area and the responses were as follows: Majority 56% noted that the cooperative management structure is very good, 37% indicated satisfactory and 7.4% indicated that the cooperative management structure was fair in their area. Respondents were asked on how they rated the contribution of cooperatives to livestock off-take in Ohangwena region. Many respondents (48.1%) said the contribution of the cooperative to livestock off-take was very good in their area. About 33% of the respondents rated the contribution as satisfactory and 19% rated a fair contribution of cooperative to livestock off-take.

Table 3.6: Weakness/strength of cooperative system and marketing channels

	Weakness/strength of the cooperatives system in the area			
	Oshikoto region (n=25)	Ohangwena region (n=27)	Oshikoto region (n=25)	Ohangwena region (n=27)
Weak	4%	0	0	0
Slightly weak	32%	14.8%	32%	22.2%
Strong	44%	77.8%	56%	70.4%
Very Strong	16%	7.4%	4%	7.4%
Extremely strong	4%	0	8%	0

Respondents were asked about the weaknesses and strengths of the cooperative system and of the marketing channel in their area. For Oshikoto region, about 32% of the respondents indicated that, the cooperatives system is slightly weak and the marketing channel is slightly weak too. Majority said that the cooperatives system is strong and the marketing channels are also strong with 44% and 56%, respectively. Only 4% said the cooperatives system in their area is excellent while 8% said the marketing channel in their area is strong.

Asked to describe the weakness or strength of the cooperative system in the area, respondents from Ohangwena region had this to say. About 78% stated that, the cooperative system in there is strong and other 14.8% describe the cooperative system in the area as slightly weak. Only 7.4% of

respondents described the system as very strong. Respondents were also asked to describe the weakness or strength of the marketing channels in the area. About 71% of the respondents described the marketing channels in the area as strong and 22% described the channels as slightly weak. Moreover, 7.4% described the marketing channels as very strong; none described it as neither weak nor extremely strong.

3.2.2 Objective 2

Evaluate the benefits that cooperatives brought to farmers and to the livestock marketing industry: The main aim was to determine the benefits that farmers derived from the cooperatives regarding to livestock marketing compared to other market institutions. The hypothesis that was tested to address this objective was:

H_1 : Cooperatives brought more benefits to farmers from Oshikoto and Ohangwena region.

In order to determine the benefits that farmers derived from the cooperatives with regards to livestock marketing compared to other marketing institutions, the researcher asked respondents on ways that livestock cooperatives benefitted communal livestock farmers. The researcher rejects the null hypothesis based on evidence presented in Table 3.7.

Table 3.7: Benefits farmers derived from the cooperatives

BENEFITS	Oshikoto region (n=25)	Ohangwena region (n=27)
Improved livestock marketing system	24%	37%
Standardized pricing system	20%	7.4%
Increased off-take	48%	11.1%
Improved herd health	8%	44.4%

Most (48%) respondents from Oshikoto region indicated that the livestock cooperative benefits communal livestock farmers in that there would be growth in the livestock industry when they

sell more livestock. Approximately 24% of the respondents said communal livestock farmers will benefit as their livestock marketing system improved because of the livestock cooperatives. Respondents from Oshikoto region noted that the communal livestock farmers benefitted from livestock cooperatives because their livestock pricing system is standardized and farmers are encouraged to keep their livestock in good health, 20% and 8%, respectively.

Ohangwena region had a high count for “improved herd health” as a benefit for communal livestock farmers at about 44%. Thirty seven percent said the farmers will benefit as their livestock marketing system will be improved. About 11% chose the benefit of the growth in the livestock industry and 7.4% said the farmers will benefit by having their pricing system standardized.

Table 3.8: Cooperative benefits to individual farmers

	Oshikoto region (n=25)	Ohangwena region (n=27)
Disagree	16%	0
Slightly disagree	20%	11.1%
Slightly agree	52%	63.0%
Agree	12%	25.9%

Asked if livestock cooperative has been of a benefit to the them (individual) as farmers, majority 52% of the respondents from Oshikoto region and 63% from Ohangwena region agreed slightly that livestock cooperative has been of benefit to them while only 12% of respondents from Oshikoto and about 26% from Ohangwena region agreed benefited. In total, 4 (16%) respondents disagreed that the livestock cooperative has not been of benefit to them.

3.2.3 Objective 3

To recommend alternative livestock marketing channels in order to improve livestock industry in the Northern Communal Areas. The hypothesis that was tested by this objective was:

H₁: Auctions organised by livestock marketing cooperatives can be alternatively substituted by direct sale of inspected livestock.

Table 3.9: Alternative livestock marketing channels to increase off-take

Alternative livestock marketing channels	Oshikoto region (n=25)	Ohangwena region (n=27)
Introduce live market auctions	32%	33.3%
Introduce direct sale of inspected livestock	28%	22.2%
Introduce direct sale to wholesale and retail businesses	28%	18.5%
Introduce livestock dealers and brokers	12%	25.9%

In order to improve livestock industry, possible livestock marketing need to be reinforced. The research aimed to gather suggestions from the respondents about possible improvements on the livestock industry marketing channels in the Northern Communal Areas. The researcher rejects the null hypothesis, For all the regions, majority suggested the introduction of live market auctions represented by 32% and 33% for Oshikoto and Ohangwena regions respectively. Farmers from Oshikoto region secondly (28%) suggested the introduction of direct sale of inspected livestock, while introducing livestock dealers and brokers was the second highest suggestion for Ohangwena region with approximately 26% followed by the introduction of direct sale for inspected livestock with 22%. Introduce direct sale to wholesale and retail businesses was the least suggested by the respondents from Ohangwena region with 18.5% of respondents.

3.2.4 Applying the Binary Logistic Regression

Binary Logistic Regression pursued the association between particular independent variables and the explanatory variables. The dependent variable is the response to question 1 in the questionnaire, “Do you prefer livestock marketing cooperative as a channel for livestock off-take?” The response to that question is a categorical variable coded 1 for “Yes” (Prefer Marketing cooperative) and 0 for “No” (Do not prefer Marketing cooperatives).

Three independent variables were used in the Binary logistic regression in order to evaluate effects on the probability that farmer preferred Marketing cooperatives as a marketing channel or otherwise, the predicted outcome variable.

The explicit model estimated from the data is:

$$\begin{aligned} \text{Logit (Livestock Marketing Cooperatives)} \\ = \alpha + \beta_1(\text{Marketing Channel}) + \beta_2(\text{Improve}) + \beta_3(\text{Benefit}) \end{aligned}$$

Where:

Dependent variable is Livestock Marketing Cooperatives,

α : the intercept and

β_1 , β_2 , and β_3 : the coefficients of the three predictors.

In the model, the independent variables were:

1. What other marketing channels do you think can best substitute livestock cooperatives? (MARKETING CHANNELS)
2. How do you think livestock cooperative marketing channels can be improved to support livestock off-take? (IMPROVE)
3. In what way will the livestock cooperative benefit communal livestock farmers? (BENEFIT)

Table 3.10: Logistic regression analysis results

	Co-efficient	Standard Error	<i>p</i> -value
Improve	-0.410	0.432	0.032**
Benefit	-0.076	0.393	0.846
Marketing Channels	0.011	0.596	0.985
Constant	-1.018	1.393	0.465

NB: **means statistically significant at 5 % level of significance

The *p*-values are all above 0.05, except for the variable “Improve” with a *p*-value = 0.032. This means that even though the Chi-squared test for Livestock marketing cooperative vs Improve was significant, as soon as the other variables were controlled for, there exists a strong association between that variable and Livestock marketing cooperative. The column titled B consists of the co-efficient for the model. A negative co-efficient shows that the odds of contributing to livestock marketing channel decreases.

Variables with odds less than 1 implies the decrease in those variable correspond with the decreasing odds of the livestock off-take, while variable with greater than 1 odds value implies that the increase value in the variable correspond to increasing odds of the livestock take-off.

As the livestock marketing channels improves and the benefits that the livestock farmers are receiving from the cooperatives correspond with decreasing odds of livestock take-off. While the marketing channels advancement correspond with increasing odds of the livestock take-off.

The regression equation shown above becomes:

Logit (Livestock Marketing Cooperatives)

$$= -1.018 + 0.011(\text{Marketing Channel}) - 0.410 (\text{Improve}) - 0.076(\text{Benefit})$$

Table 3.11 shows the insignificant predictor of the findings is Improve. Thus, with every preference in livestock marketing cooperatives, the odds that the livestock off-take improves (either by introducing live market auctions or by introducing a direct sale of inspected livestock) will increase by a factor of 0.664.

Table 3.11: Model summary of the logistic regression analysis

-2 Log likelihood	Cox & Snell R Square	Nagelkerke R Square
36.032	0.220	0.430

The lower the -2 log likelihood value of the model, the better the fit of the model (Hair, Black, Babin, & Anderson, 2009). Spicer (2004) cautions against putting faith on log likelihood measures in logistics regressions. However, Spicer (2004) recommends that the two R² measures are regarded as tentative on the pointers of the range where the actual influence of the independent variables on the dependent variable lies. The independent variables would consequently explain anywhere between 22% and 43% of the difference in the results. However, “pseudo statistics” can be used with caution, i.e., “They are best treated with caution if not actually avoided” Spicer (2004).

Table 3.12 shows a classification table, which shows the observed and predicted data classifications.

Table 3.12: Classification table for observed and predicted data

Observed		Predicted		
		Do you prefer livestock marketing cooperatives as a channel for livestock off-take?		Percentage Correct
		Yes	No	
Do you prefer livestock marketing cooperatives as a channel for livestock off-take?	Yes	46	0	100
	No	6	0	0
Overall Percentage				88.5

a. The cut value is .500

The overall percentage row tells us that this approach to prediction is correct 88.5% of the time. A high percentage accuracy in classification reflects the percentage of cases that can be correctly classified by the model. Table 3.12 has a subscript which states that "The cut value is .500". This means that if the probability of a case being classified into the "yes" category is greater than .500,

then that particular case is classified into the "yes" category. Otherwise, the case is classified as in the "no" category.

Table 3.13: Hosmer and Lemeshow test of the logistic regression analysis

Step	Chi-square	Sig.
1	10.771	.215

Table 3.13 displays the goodness-of-fit of the mode. As shown, the model fits the data well as indicated by a non-significant chi-square ($p > 0.05$).

4 CONCLUSIONS AND RECOMMEDATIONS

4.1 Conclusions

One strategy local farmers can use for possibly adding value to cattle is to cooperate with other market participants. Majority of the farmers prefer livestock cooperatives. The findings indicated that livestock cooperatives have improved access to markets for communal farmers in both regions. When off-take increases, there is a positive contribution to household income and agGDP. Respondents also indicated that herd health improved through cooperative mentorship programs. There was an indication that the best alternative to livestock marketing cooperatives would be open markets. Finally, yet importantly, respondents indicated that improving cooperative marketing channels will significantly influence preference of marketing cooperatives. This means that benefit and marketing do not influence the marketing channel of livestock in the two regions, hence they are not significant in the model.

4.2 Recommendations

Following the findings and conclusions, the study recommends that:

1. Most farmers travel long distances to the cooperatives offices, meaning there are always difficulties in accessing information that is related to the activities of cooperatives. Hence,

it is against this background that cooperatives must conduct robust mobilization activities to ensure that all farmers are reached, consequently increasing market participation.

2. Long distances, which farmers travel to auction kraals also have a negative impact on the participation of farmers in auctions. Cooperatives should make use of all potential auction kraals in their regions to cut long distances travelled by farmers.
3. The Division of Cooperatives Development within MAWF must ensure that cooperative management structures are frequently capacitated on key cooperatives management aspects to ensure that cooperatives are efficiently managed.
4. Considering the marketing opportunities available for the NCA farmers' more emphasis must be put on conducting live market auctions as this is the most preferred marketing channel by farmers. Live market auctions have certain advantages such as:
 - There is a huge variety of the livestock available to choose from. The buyers get an option to select from the wide range of the genetics or the pedigrees which are available at the auction market,
 - Reduce days on market,
 - Owners can achieve premium prices, and
 - Its transparent, meaning business is conducted in an open and professional environment.
5. All stakeholders involved in the livestock industry should promote the development of farmers' organisations because it is better way of managing marketing of livestock.

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