EFFECT OF EXTENSION SERVICE(S) AND SOCIO-ECONOMIC CHARACTERISTICS ON THE LIVELIHOOD OF NGUNI CATTLE DEVELOPMENT PROJECT BENEFICIARIES IN NORTH WEST PROVINCE: A TOBIT-OLS REGRESSION APPROACH.

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ABSTRACT

The place of extension and advisory service(s) in enhancing farmer's knowledge, skills, as well as technologies cannot be overemphasised. This study was carried out in the North West Province of South Africa, with the aim of assessing the effect of the extension service(s) combined with socio-economic characteristics on the livelihood of the Nguni Cattle Development Project beneficiaries. Random sampling techniques were used to select a sample of 128 beneficiaries from the 187 beneficiaries involved in the project. A final 76 beneficiaries participated in the study. Descriptive and inferential statistics were employed for the data analysis. The descriptive results showed that an average age of 55 years was recorded in the study, respondents were predominantly male and married, with an average household size of five people, having 16 years of farming experience, and with an average farm size of 400.5 hectares. Ordinary Least Square regression and the Tobit regression model were tested and found to be a good fit to the data. Furthermore, variables such as gender (p<0.05), cattle rearing experience (p<0.05), extension visits (p<0.10), marketing strategies/ opportunities (p<0.05), cattle production (p<0.10), and milk production (p<0.10) were found to have a significant association with the livelihood of the beneficiaries in the study. Based on the current findings, urgent and timely policy interventions are needed in providing relevant information through extension and advisory services to the beneficiaries of this programme in order to enhance their productivity and livelihood.

Keywords: Socio-economic characteristics, extension services, livelihood, Nguni Cattle Development Project, North West Province

1. INTRODUCTION

The concept of extension and advisory service(s) is a term that is widely open to different interpretations. Extension does not have a universally accepted definition. However, AgriInfo (2015), defined the science of agricultural extension as an applied behavioural science, the knowledge of which is applied to bring farmers or people through various strategies and programmes of change by applying the latest scientific and technological innovations. Extension education, its principles, methods, and techniques are applicable not only to agriculture, but also to other sciences. Furthermore, agricultural extension can also be viewed

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as the transfer of knowledge, science, and technology from laboratories to farmers in order to assist with farm planning, decision making, record keeping, the use of inputs, storage, processing and marketing, ensuring supplies and services, increasing production, capacity building, and improving their occupation, family livelihood, and community life.

In addition, agricultural extension is known as the application of scientific research and new knowledge to agricultural practices through farmer education. The field of extension now encompasses a wider range of the communication and learning activities organised for rural people by professionals from different disciplines, including agriculture, health, and business studies. According to Syngenta Foundation of Sustainable Agriculture (2016), agricultural extension is the function of providing need- and demand-based knowledge in agronomic techniques and skills to rural communities in a systematic, participatory manner, with the objective of improving their production, income, and (by implication) quality of life. Extension is essentially education and it aims to bring about positive behavioural changes amongst farmers.

Syngenta Foundation of Sustainable Agriculture (2014) also defined extension service as a "practical application of useful knowledge to the farmer and his household". Koch & Terblanché (2013) stated that agricultural co-operatives, community organisations, and the private sector also render services. Furthermore, extension is divided into three main sectors namely, the public sector, the private non-profit sector, and the private profit sector. The public sector includes ministries and the Department of Agriculture and Agricultural Research Centres. The private non-profit sector includes local and international Non-Governmental Organisations (NGOs), foundations, community associations, as well as bilateral and multilateral aid projects. The private profit sector includes commercial production and marketing firms, commercial farmers or farmer group operated enterprises where farmers are both users and providers of agricultural information, trade companies, and media enterprises (Syngenta Foundation of Sustainable Agriculture, 2014).

According to Oladele, Kayoma, & Sakagama (2004:276), agricultural extension and advisory services have been changing over the past few decades. These changes are attributed to many factors that include policy and political changes and recently the introduction and participation of NGOs in farmer support services. The introduction and implementation of Agricultural Development Programmes (ADP's), which are mainly funded by the government to increase agricultural production as well as extension and advisory services, were placed in the hands of the public extension workers to render the services to the farmers, helping them become more production inclined and to increase their incomes.

Livestock occupies a cogent position in assisting households to cope with difficulties since farmers can easily trade their animals for cash (Imai, 2003:271). Cattle, in particular, are known for many products such as being reared for meat production, milk production, hides and skins, cash income, the source of draught power on farmlands (ploughing, traction, and irrigation), and natural fertilizers (Traore, 2010). According to Bester, Matjuda, Rust, & Fourie (2008:46), Nguni cattle were first introduced to South Africa in approximately 600 A.D. European colonisation in the 19th century altered the progress of this low-maintenance breed with the introduction of exotic breeds into the colony. This, in turn, altered the original gene of the Nguni cattle. However, a developed structure in the 20th century gave room for the commercial sector to improve the Nguni breeds (Bester *et al.*, 2008).

The cattle are known to be able to survive under harsh conditions which include adaptive traits such as the ability to walk long distances and to be, tolerant to extreme temperatures. It has also been scientifically proven that this breed of cattle has a good resistance to diseases. The cattle are multi-coloured as there are over 80 colours in either uniformed, spotted or pied patterns (Bester *et al.*, 2008). Nguni cattle hides have many advantages and their meat is economically valued. This has prompted large car manufacturing companies such as BMW and Mercedes-Benz to use the hide for making leather car seats.

Agricultural development programmes are schemes established to increase and improve farmers' standard of living in the area of their livelihood, the improvement of their environmental status, farming skills, knowledge and hence, improving production and livelihood. An example of the development programme is the Nguni cattle development scheme. The aim is to train the Nguni cattle farmers on how to breed and maximise their cattle. As a result, the provincial government together with the North West Provincial Department of Rural, Environmental and Agricultural Development (READ) introduced the North West Nguni Development Project. Farmers were to participate in the development programme and work with extension and advisory officers in order to obtain the maximum output from the programme (SANews, 2013). Cwaile, Antwi, & Oladele (2012:1575-1580) stated that training and participating in a project is a tool for increasing the capacity of the beneficiary. It is common knowledge that financial capital is not the only factor that can contribute towards the improvement of poor families' livelihood. Food security, accommodation, education, and networks are all factors that also positively contribute towards improving a families' livelihood.

The North West Nguni cattle development project began in February 2006 as a partnership between the Industrial Development Corporation (IDC), READ, and the North West University (NWU) with the aim of re-introducing Nguni cattle in the province by providing deserving beneficiaries with heifers and bulls on a "grant-loan" basis. The project has reached the 9th phase and consists of 78 sites across the province that are visited on a regular basis. Each of the 78 project sites have been provided with 23 heifers and one bull to allow them to build a nucleus herd. The cattle were provided to beneficiaries in the form of a loan where each beneficiary project entered into a contract committing to return 11 heifers and one bull to the project of the progeny after a five-year period. It was also agreed that beneficiaries would keep the remaining animals and any progeny resulting from efficient management of the land for production (i.e. the "grant–loan concept"). These would then be given to another community in order to make a self-sustainable and expanding Nguni cycle (Somoro, 2009). The project focused specifically on emerging farmers. The Nguni cattle were chosen for the project as it is an indigenous breed that can survive under many divergent management systems while maintaining a high level of fertility.

The efficiency of agricultural extension work depends on the availability of personnel who are qualified, motivated, committed, and responsive to the ever-changing social, economic, and political environment (Belay & Abebaw, 2004:139). A lack of proper training facilities for extension officers has increased the gap between farmers' production returns and their livelihood in rural South Africa. Developing rural agriculture will lead to productivity growth in agriculture, improvement in quality and competitiveness in agriculture, increase in market share of agriculture, output growth in agriculture, and increase in farmers' income which will ultimately lead to poverty reduction and good livelihood. Thus, the current study sought to determine what the socioeconomic characteristics of the respondents were, as well as what the effect of the extension and advisory services were on the livelihood of beneficiaries.

2. CONCEPTUAL FRAMEWORK

The conceptual framework for extension and advisory services discusses how agricultural extension programmes are used to enhance farmers' knowledge and skills, as well as to promote and expand on improved technologies which affect farm productivity amongst livestock holders. According to Anderson & Feder (2003:3-6), improvement in productivity is only possible when there is a gap between actual and envisaged productivity. They further suggested two types of 'gaps' that contribute to the productivity differential, namely "the technology gap and the management gap". Feder, Murgai, & Quizon (2004:221-243) stated that the reduction of the productivity differential by increasing the speed of technology transfer and by increasing farmers' knowledge and assisting them in improving farm management practices can be achieved through extension. Thus, the importance of extension and advisory services as a strategic function was highlighted as integral to successful land reform.

The agricultural sector, which is also the food department of a nation, acts as a gap to development for rural communities. The rural standard of living is improved upon through the contribution that the agricultural produce brings into the community. Production can be enhanced, together with the standard of living, through improved extension and advisory services rendered to the farmers in the community. Furthermore, poverty could be reduced through increased returns from their productions, while livelihood is improved. Partnerships between the government arm and some important key-acts within the communities should be implemented in order to continue to provide timely and adequate extension and advisory services so as to continue the vision of reducing and alleviating poverty in society. Ten years down, agricultural services in South Africa have passed through a phase of basic change from a dual service to a single consolidated delivery system, particularly putting more focus on the needs of both the disadvantaged small-scale farmers and the large-scale farmers.

The need for a total re-adjustment and fine-tuning of agricultural extension services was made imperative through the realisation of broadening access to agriculture with the emphasis that the delivery system is key to the transformation of the small-scale sector of agriculture. Moreover, appropriate communication of new ideas should be transferred to farmers regularly. The current form of extension services has raised a serious concern due to its efficiency and relevancy which has also prompted the government to want to broaden its policy about extension services to review and reform it urgently in terms of its effectiveness, structure, relevancy, content, and focus.

This conceptualisation of extension services has formed the basis for the Transfer of Technology (TOT) and Extension Model (Terblanché, 2008:58-84). Furthermore, Zwane (2012:1) explained that extension has three different dimensions. Firstly, extension should be viewed in terms of agricultural performance, which means it is only viewed in terms of improving production and profitability amongst farmers. Secondly, he equated extension to rural community development in which extension is viewed as working to advance rural communities through the improvement of their agricultural development tasks. In the third dimension, he equates extension to comprehensive non-formal community education which is viewed as a provider of non-formal agriculturally related education in a community.

2.1 Support to agriculture through extension and advisory services

Rivera, Qamar, & Crowder (2001) have highlighted that support is vital in the agricultural sector. It is the medium in which innovations, new technologies, and farming techniques are best introduced to communities living in rural areas. This is as a result of their lack of access to information through the internet and other mediums of information transfer. Extension and advisory services encourage mouth-to-mouth passage of information, as well as physical demonstrations of innovations and improved methods. Extension aids the passage of innovations from the scientists to the farmers, thereby assisting farmers in decision-making, as well as setting and clarifying their own goals. Agricultural extension or advisory services has been an important force in the agricultural development over the centuries. Thus, agricultural extension services ultimately act as the link between the farmers and the researchers. Extension also serves as a means of training and guidance in decision-making amongst farmers.

Rivera *et al*., (2001) stated that "agricultural extension is also concerned with providing information on other crucial issues such as food storage development, processing, farm management, and marketing". Ultimately, if the extension department is not given the needed attention, the development of the agriculture and livestock sector would not take place. If extension workers are well empowered, the expectation would be that each extension agent who benefited from this empowerment would be an expert in at least one field of technical agriculture, so as to be successful in delivering outstanding services to the farmers with all its duties which are all capsulated in communication. Mwangi (1998:1-7) further stated that a good extension officer should be able to communicate, teach farmers, convince, and influence them into adopting innovations or existing, improved upon technologies.

3. METHODOLOGY
3.1 Study area

This study was carried out in the North West Province of South Africa with a total area of 106 512 km^2 and an estimated population of 3 676 300 (Statistics South Africa, 2010). The province is divided into four districts namely, Bojanala Platinum District, Dr. Ruth Segomotsi Mompati, Ngaka Modiri Molema, and Dr. Kenneth Kaunda Districts.

3.2 Sampling procedure, population, sample size, and research instrument

Random sampling techniques were used because of the stratification of the Nguni cattle development project. As such, beneficiaries from each project site had an equal chance of being selected. The respondents were all beneficiaries from all four of the districts in the North West Province who are participating in the Nguni Cattle Development Project. Of the 187 beneficiaries in the project, a sample of 128 beneficiaries was selected, of which 76 beneficiaries participated in the study based on the recommendation of Krejcie and Morgan (1970:607-610).   A structured questionnaire was used as the research instrument to collect the data.

4. DATA ANALYSIS

Descriptive statistics such as percentages, frequency tables, and mean scores were used in describing the socio-economic characteristics of the Nguni beneficiaries in the study area. In addition, the adopted inferential statistics of Ordinary Least Square Regression and Tobit Regression were used.

Ordinary Least Square (OLS) regression was used to test the relationship between the independent variables and the dependent variable, in other words, the effect of respondent's socio-economic characteristics on Nguni development project beneficiaries. The implicit function was used as follows:

$$Y_t = \beta_1 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \ldots e_0 \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\text{Equation 1}$$

Where Y_t = Total annual income, β_1 = Parameter estimate, X_1 = Age, X_2 = Gender, X_3 = Marital status, X_4 = Household size, X_5 = Land-Ownership, X_6 = Farm size in Hectares, X_7 = Rearing experience, X_8 = Farming experience, X_9 = Extension visit, and e = Error term.

In addition, the Tobit regression analysis of the effects of the extension and advisory services on the Nguni development project beneficiaries' livelihood was conducted. The implicit Tobit function is thus stated as:

$$Y_i^* = x_i \beta + \varepsilon_i \ldots\ldots\ldots\ldots\ldots\ldots\text{Equation 2}$$

Where Y_i = total income, β = parameter estimate, Xs are as defined for the equation as the independent variables used for the analysis which includes: X_1 = Provision of medication, X_2 = Provision of Vaccine, X_3 = Marketing strategies, X_4 = Marketing opportunities, X_5 = Cattle production, X_6 = Milk production, X_7 = Hides and skin, X_8 = General training in cattle rearing, X_9 = Feeding techniques, X_{10} = Dipping process, X_{11} = Vaccination techniques, X_{12} = Milking technique, X_{13} = Hides and skin production, X_{14} = Marketing of farm produce, and ε = Error term.

5. RESULTS AND DISCUSSION
5.1 Socio-economic characteristics of Nguni beneficiaries in North West Province of South Africa

The socio-economic characteristics of Nguni beneficiaries are shown in Table 1.

The findings of the study showed that respondents' (Nguni programme beneficiaries) ages ranged between 20-90 years with an average age of 55 years. The results further showed that most of the farmers in the study area were between the ages of 51-60 (28.9%) and 31-40 (23.7%). Only 17.1% of the respondents fell between the ages of 20-30, while a further 13.2% were between 41-50 years of age. Very few respondents (1.3%) were between the ages of 81-90. Even though the results show that the majority of respondents were in their 50's, they were still very active to be involved in cattle farming. These farmers put in the best of their strength and energy to increase their productivity and invariably welfare as presented in Table 1. In addition, the findings showed that 75% of the respondents were male and 25% were female. This result shows that there are more males than female participants involved in Nguni cattle farming in the study area. This finding is corroborated by the findings put forward by Okoedo-Okojie (2015:184) who states that agriculture is dominated by men.

Table 1: Socioeconomic characteristics of the respondents

Age	Frequency	Percentage
20-30	13	17.10
31-40	18	23.68
41-50	10	13.16
51-60	22	28.95
61-70	9	11.84
71-80	3	3.95
81-90	1	1.32
Gender		
Male	57	75.00
Female	19	25.00
Marital Status		
Single	33	43.42
Married	35	46.05
Separated	1	1.32
Divorced	1	1.32
Widowed	6	7.89
Educational Level		
Matric	25	32.89
Diploma	10	13.16
Degree	7	9.21
Others/Standard	33	43.42
None	1	1.32
Household size		
1-4	31	40.79
5-8	37	48.68
9-12	8	10.53
Farming experience		
1-10 years	35	46.05
11-20 years	23	30.26
21-30 years	8	10.53
31-40 years	8	10.53
41-50 years	2	2.63
Land Ownership		
Yes	17	22.37
No	59	77.63
Farm size (Hectares)		
100-300	8	10.53
301-500	40	52.63
501-700	8	10.53
701-900	7	9.21
901-1100	3	3.95
1101-1300	1	1.32
1301-1500	9	11.84
Farming Land		
Family land	14	18.42
Communal land	11	14.50
Lease land	47	61.84
Others	4	5.26
	N=76	100

The current results further show that 46.1% of the respondents are married and 43.4% are single. Furthermore, 1.3% are separated and divorced, while 7.9% have been widowed. This finding is further supported by those of Omotayo (2011), were most of the farmers (producers) were found to be married. It was suggested that this could positively affect the productivity and welfare of the business as other family members, such as the wife and children, could assist with the farming, thereby serving as a source of labour.

Moreover, most of the respondents (43.4%) fell under the old standard of education. This is supported by the finding of Ogunkoya (2014:56-57), which revealed that the majority of the respondents in her study had the standard form of education. The study further revealed, as indicated in Table 1, that 32.9% of the respondents had matric certificates, 13.2% are diploma holders, 9.2% are degree holders, and 1.3% of the respondents have no form of education at all. This finding is in line with a statement made by the Land Bank of South Africa (2000), that farmers who have passed standard five are regarded as literate enough to make decisions about production and the requirement of agriculture. However, Cutrufelli (1983) disagrees with that statement and argues that education has negative effects on agriculture as it offers an alternative type of living away from agriculture. It is generally acknowledged that agriculture education and training are of vital importance in promoting sustainable agricultural production, rural development, as well as ensuring household food security.

The study revealed that 48.7% had a household size of between 5-8, 40.8% between 1-4 while 10.5% of the respondents had a household size between 9-12. The mean household size of the total respondents was 5. Household size can be reckoned to be a great contributor to productivity. Ajani & Ashagidigh (2008:264) stated that a household's contribution to productivity could be said to be based on a personal view of interest as an increase in household size increases expenditure and this decreases farmer's annual income.

Table 1 also shows that the majority of participants (46.1%) have 1-10 years of farming experience. This was followed by 30.3% of farmers with 11-20 years of farming experience and 10.5% for each category of 21-30 years and 31-40 years. Very few of the participants (2.6%) had 41-50 years of farming experience. Similar results were obtained by Ogunkoya (2014:56-57) who indicated that approximately 47.2% of farmers have 7-12 years of farming experience.

In addition, 22.4% of the respondents do have ownership of the land in which they farm on, and the majority (77.6%) of the respondents do not own the farm land they practice with. This indicates that land ownership for this Nguni cattle development project may be a hampering factor to the increased productivity. Furthermore, it shows that respondents with no land ownership either farmed on family land (18.4%) or communal land (14.5%), while the majority of participants (61.8%) farmed on leased land. According to FAO (2000), factors such as land, credit, extension education, and appropriate technology still serve as major constraints for farmers in the developing countries.

According to the findings in Table 1, the majority of respondents (52.6%) had 301-500 hectares of farming land to rear their cattle, while 11.8% had access to 1301-1500 hectares. A further 10.5% and 9.2% of the respondents had between 100-300, 501-700, and 701-900 hectares respectively. Furthermore, 3.9% of the respondents reared their cattle on 901-1100 hectares of land. The mean farm size was 400.5 hectares.

5.2 Modelling the effect of respondent's socio-economic characteristics on Nguni development project beneficiaries using ordinary least square regression.

The results as presented in Table 2 indicate that the Nguni beneficiaries' gender was positively (0.3952101) significant ($P \leq 0.05$). This means that males have a higher likelihood of being a beneficiary of the Nguni programme in the study area. This is in line with the previous findings from the current study as 75% of the respondents were male beneficiaries. In addition, the parameter of the respondents' land-ownership pattern had a negative (-0.2520691) and significant ($P \leq 0.10$) effect on the productivity of the respondents in the study area. This indicates that a lack of land by an intending member reduces the likelihood of such an individual becoming a Nguni programme beneficiary in the study area. This finding raises concern as the majority of the beneficiaries were not rearing cattle on their own land, but rather on leased or rented farms.

Table 2: The effect of respondent's socio-economic characteristics on Nguni development project beneficiaries.

Variables	Coef.	Std. Err.	T	p>|t|	[95% Conf.	Interval]
Age	0.0297421	0.1007655	0.30	0.769	-0.1715601	0.2310444
Gender	0.3952101	0.1547542	2.55	0.013	0.0864839	0.7039362
Marital Status	0.0021693	0.0668538	0.03	0.974	-0.1313865	0.135725
Household Size	0.0280927	0.0256419	1.10	0.277	-0.0231329	0.0793184
Land Ownership	-0.2520691	0.137475	-1.83	0.071	-0.5263962	0.022258
Farm Size	0.0008534	0.0001704	5.01	0.000	0.000513	0.0011937
Rearing Experience	0.0693957	0.0290114	2.39	0.019	0.0115194	0.1272719
Farming Experience	-0.0138945	0.008252	1.68	0.097	-0.0303701	0.0025811
Extension Visit	0.183354	0.0961619	1.91	0.061	-0.0086394	0.3753474
_constant	10.21664	0.2447598	41.74	0.000	9.727676	10.7056

Number of obs = 76, Prob > F = 0.0001, R^2 = 0.5002, Adj R^2 = 0.4159

Furthermore, the parameter of respondents' farm size in hectares had a significantly ($p \leq 0.01$) positive (0.0008534) effect, which implies that the size of the respondents' farms has a higher likelihood of increasing the chances of continuing with the Nguni programme. This finding was expected since it is rational to expect an increase in productivity over the years which would result in increases in farm sizes. Moreover, respondents' coefficient of cattle rearing experience had a positive (0.0693957) and significant ($p \leq 0.05$) effect, which implies that a unit increase in the years of cattle rearing experience of respondents leads to a unit increase in their likelihood of continuing to be a Nguni beneficiary in the study area. This is in line with the a priori assumptions, as an additional year(s) of cattle rearing experience leads to more knowledge and mastery of the business, thereby resulting in better productivity and continued enjoyment of the privilege of Nguni programme membership in the study area.

Finally, the parameter of respondents' farming experience was negatively (-0.0138945) significant (p ≤ 0.10) and this indicates that farming experience has a lower likelihood of influencing becoming a beneficiary of the Nguni programme in the study area. This could be as a result of some respondents who apply for membership being experienced in crop husbandry where the programme is set to teach and incorporate such individuals to make the beneficiary as well. Finally, the coefficient of extension visits to respondent farms had a positive (0.183354) and significant impact (p≤0.10) on becoming beneficiaries of the programme in the study area. This implies that access to extension and advisory services by the respondents would improve their living standards and increase production, thus allowing them to be Nguni programme beneficiaries in the study area. This finding was also expected as extension and advisory services are key to successful agricultural productivity in the study area.

5.3 Effects of extension and advisory services on the Nguni development project beneficiaries' livelihoods

Income is a potent proxy for livelihood as a dimension of livelihood. Literature is explicit about the five pillars of livelihood which includes financial capital (stocks of money or assets in liquid form), natural capital (land, water, and biological resources), social capital (rights or claim derived from group membership), physical capital (infrastructure, resources created through economic production), and human capital (quantity and quality of labour available). However, financial capital was used as the proxy for livelihood in this study as shown in Table 3. There were 14 independent variables which were used for Tobit regression analysis on STATA 12 and out of these variables, 10 were found to be significant.

The study shows that the coefficient of the provision of medication had a negative (-0.7356918) and significant impact (p≤0.05) on the livelihood of Nguni beneficiaries. This indicates that the use of medication by the respondents on their livestock has a lesser effect on the livelihood of the beneficiaries of the Nguni programme. This is in opposition to the a priori expectation that the administration of medication to livestock ought to increase the respondents' likelihood of having a good livelihood. In the same vein, the parameter of the provision of vaccine by the respondents had a positive (1.043064) significance (p≤0.01) impact on the livelihood of the beneficiaries. This finding implies that increases in respondents' provision of vaccine programmes for their livestock leads to increases in their livelihood. This is in line with existing literature where Noah (2002) confirms that it is highly imperative to vaccinate since it is a major part of cattle production.

In addition, the coefficient of the beneficiaries' marketing strategies and the marketing opportunities were both negative (-0.5621644 and -0.1882706 respectively) and significant at p ≤ 0.05 and p ≤ 0.10 respectively. This indicates that lesser marketing strategies and marketing opportunities by the Nguni beneficiaries result in better livelihoods of the beneficiaries in the study area. This does not conform to the a priori expectations of the research as proper training in marketing strategies and access to market was supposed to improve the livelihood of the respondents in the study area through improved income generation from farm produce and cattle sales.

Table 3: Analysis showing the effects of the extension and advisory services on the Nguni development project beneficiaries livelihoods

Variables	Coef.	Std. Err	T	p>|t|	[95% Conf.	Interval]
Provision of Medication	-0.7356918	0.2943924	-2.50	0.015	1.324564	-0.1468193
Provision of Vaccine	1.043064	0.3144135	3.32	0.002	0.4141432	1.671984
Marketing Strategy	-0.5621644	0.2547198	-2.21	0.031	1.07168	-0.0526491
Marketing Opportunity	-0.1882706	0.1023815	-1.84	0.07	0.3925162	0.0159749
Cattle Production	0.0130365	0.064827	0.20	0.841	0.1427098	0.1166368
Milk Production	-0.2391416	0.0829483	-2.88	0.005	-0.405063	-0.0732203
Hides and Skin	0.0891704	0.0609652	1.46	0.149	-0.0327781	0.211119
General Training	-0.091309	0.0591986	1.54	0.128	-0.0271059	0.2097239
Feeding Technique	-0.1071719	0.060343	-1.78	0.081	-0.2278759	0.013532
Dipping Procedure	-0.1670248	0.0784466	-2.13	0.037	-0.3239414	-0.0101083
Vaccination Technique	0.3438676	0.189149	1.82	0.074	-0.0344868	0.722222
Milking Technique	1.144874	0.1391917	8.23	0.000	0.8664493	1.423299
Hides and Skin Production	-0.1440233	0.0693982	-2.08	0.042	-0.2827046	-0.0053421
Marketing of farm Produce	0.1148897	0.1624228	0.71	0.482	-0.2100043	0.4397838
Constant	11.15882	0.8252472	13.52	0.000	9.508079	12.80956
Sigma	0.4647876	0.038634			0.387508	0.5420671

Number of obs = 76, LR chi2(14) = 33.69, Prob > chi^2 = 0.0023, Log likelihood = -49.059237, Pseudo R^2 = 0.2556

Furthermore, the parameter of milk production was found to be significant (p ≤ 0.01) and negative (-0.2391416) to the livelihood of the beneficiaries. This indicates that milk production reduces the likelihood of the respondents having a good livelihood in the study area. This was not expected but could be homogeneous to the study area. Similarly, the coefficient of respondents' feeding technique for their cattle was negatively (-0.1071719) significant (p ≤ 0.10) with their livelihood, which is contrary to results obtained by Chiba (2014:454), who showed that proper feeding techniques for cattle always have a positive significance for the animals which will in turn contribute to the farmer's income after the sale.

The dipping process adopted by the respondents also had a negative (-0.1670248) significance to the livelihood of the beneficiaries (p ≤ 0.05). Junquera (2015) highlighted that dipping as a process or procedure remains the most efficient and economic method for periodically treating a very large number of animals against ticks, flies, mites, lice, and other external parasites. This is still the case in many cattle farms in several tropical and subtropical

parts of the world, where thousands of cattle have to be dipped monthly or even weekly in order to improve their health and productivity.

Furthermore, the vaccination technique coefficient had a positive (0.3438676) and significant ($p \leq 0.10$) impact on the livelihood of the beneficiaries in the study area. This result is further supported by Gunn, Jensen, Williams, Parsons, Hudson and England (2013), who argue that proper procedures and guidelines, if followed, would always have a great effect on the production and income generations in cattle. The parameter of respondents' milking techniques was also positive (1.144874) and significant ($p \leq 0.01$). This reveals that increases in milk production through an efficient milking technique by the farmer would lead to improvement in their livelihood in the study area. Finally, the parameter of hides and skin procedures were significant ($p \leq 0.05$) and negative (-0.1440233). This finding is in conflict with the a priori assumption that respondents' hide and skin processing methods would be expected to positively influence their livelihood in the study area.

6. CONCLUSION

There are some pertinent policy issues arising from the conclusion of this study. Firstly, the study concludes that there is the need for a review of the conditions for becoming a Nguni cattle development beneficiary in the study area, as the study reported a scanty number of the beneficiaries when compared to the population of the entire residence of the study area. Secondly, the ageing state of the present beneficiaries as well as gender inequality as observed in the male-female ratio of the present beneficiaries in the study area. Thirdly, there is a need for family planning awareness creation to beneficiaries of the programme in order to ascertain better livelihoods by the beneficiaries, especially during the early years of their membership when they are possibly still trying to understand the business. Fourthly, there is a need to promote extension visitation and advisory services to enhance knowledge, advises, and information dissemination to the respondents in order to boost productivity, and ultimately, the livelihoods of the beneficiaries. Finally, the income of the participants remains low with regards to their family size. This matter should be critically looked into since income is a key component of livelihood.

7. RECOMMENDATIONS

Based on the findings of the study, we recommend that there should be a review of the conditions for the selection of the beneficiaries of the Nguni Cattle Development Project so that more people will enjoy the benefits of the programme. The constituted authority in charge of the Nguni programme should introduce more active and agile youths into the programme as well as to consider gender equality in their selection process. In addition, the government of the day should intensify their effort on family planning awareness so that the poor rural farmers can have better livelihoods. Furthermore, training programmes should be given to extension officers on Nguni cattle in order to assist them in disseminating timely information to the programme beneficiaries. Aggressive dissemination of information through extension officers, continual subsidisation of vaccines by the government, and better communication strategies between extension officers and beneficiaries should be developed in order to improve farmers' productivity and income level.

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