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Socio-economic Factors Determinantsing of Commercialization of Smallholder Rabbit Production among smallholder farmers in Mt Darwin District of, Zimbabwe

Deliwe Sylvester[1], Clayton Mashapa[2]*, Lighton Dube[3] and May Mrema[1,4]

[1]Faculty of Agriculture and Natural Resources, Africa University, P. O. Box 1320, Mutare, ZimbabweScience and Technology, Zimbabwe Open University, Mashonaland Central Regional Office, Private Bag 984, Bindura, Zimbabwe.
[2]Caritas International, Zimbabwe, Roman Catholic Diocese of Mutare, Private Bag 877, Mutare, Zimbabwe.
[3]Faculty of Commerce and Law, Zimbabwe Open University, National Office, P. O Box MP 111, Mt Pleasant, Harare, Zimbabwe.
[4]Faculty of Agriculture and Natural Resources, Africa University, P. O. Box 1320, Mutare, Zimbabwe.

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***Corresponding Author**
Clayton Mashapa
E-mail: *clayiemashapa@yahoo.co.uk*
Phone:

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ABSTRACT

A study was conducted to analyze the socio-economic factors influencing commercialization of rabbit production in communal areas of Mt Darwin district of Zimbabwe. A study sample of 85 smallholder rabbit farmers was randomly selected across the study area. Data were collected by means of questionnaires and analyzed using descriptive and inferential statistics. Results revealed that 81.2% of respondents had attained some form of education and 63.5% had more than 6 years of rabbit farming experience. It was also observed that access to agricultural extension services, rabbit producer price, agricultural education and experience in rabbit keeping significantly ($P < 0.05$) influenced commercialization of rabbit farming by the farmers. It was concluded that improved access to agricultural extension services by a farmer, good rabbit producer prices, level of agricultural training attained by a farmer and years of rabbit farming experience of a farmer ease farmer's ability to adopt commercial rabbit production and hence a higher production level. It was recommended that Zimbabwe national government create an enabling environment that promotes adequate technology transfer to farmers. Also, an investment in agro-industries that deal with the value chain components of rabbitory could be embarked upon by the government in order to improve on value-addition by farmers which would in-turn lead to more favourable prices.

INTRODUCTION

In developing countries, small livestock production is perceived to improve household food security (Cheeke, 1986; Lukefahr and Cheeke, 1990). Small livestock specialists advocate that potential exists for viable rabbit production in Least Developing Countries for improved household food security and livelihood restoration (Lukefahr, 2004; Lukefahr, 2008). During the World Rabbit Congress of 2004, a proposition of the Small-Scale Rabbit Production Model was introduced and ratified (Lukefahr, 2004). This model was meant for the Less Developed Countries so that they could adopt rabbit keeping as a livelihood strategy. The Zimbabwe Ministry of Agriculture and Irrigation Development in partnerships with various Non-Governmental Organizations in food security and livelihoods programmes are implementing small livestock income generating projects targeting vulnerable rural communities in semi-arid environments of Zimbabwe (Chimedza and Kamusewo, 2010). One such rabbitry project area is Mount Darwin district in northern Zimbabwe.

Rabbit farming offer a number of advantages for limited-resource farmers as they can be produced under small to medium scale or backyard systems. Starting a rabbit project requires minimal initial capital outlay. Additionally, a rabbit can be easily sold when a small amount of money is needed to meet immediate family needs. In addition, rabbits require small amounts of feed and use inexpensive, easily constructed housing (Cheeke, 1986). Rabbits are a quick-breeding source of low-fat, high-protein meat and have long been enjoyed as food by people around the world. As a fine-grained white meat, it can be substituted for chicken in many recipes. Rabbits reproduce prodigiously and it falls under the category of white meat which is ideal and on demand by HIV/AIDs patients. It is a delicacy in most urban centers of Zimbabwe. Elsewhere, in Egypt, Lukefahr (2008) noted that rabbit production projects attracted and employed the youths in rural areas and it retarded youth migration from rural to urban areas. In Ghana, there is a record of rabbit rearing adoption on the combined
basis of the low habitat requirement, high reproductive rates, no apparent competition with humans for food, minimal transmission of diseases from rabbits to human beings and low capital investment requirement has been reported (Mamattah, 1979). Ajala and Balogun (2004) noted that rabbit production is a veritable way of alleviating animal protein deficiency in Nigeria. Similarly, Lukefahr (1999) described rabbit production in countries like Tanzania, Kenya and Sudan as ideal for vulnerable rural farmers as a source of protein food and household income.

Despite a variety of encouraging factors of rabbit production as a smallholder household enterprise (Smith, 2005; Son, 2008), rabbit rearing is less adopted and commercialized in Zimbabwe (Collin and Lebas, 1996). Rabbit farming is still not given much attention by the country as evidenced by the fact that no official national statistics are available on production and consumption trends. FAO (1997) estimates that Zimbabwe produces between 1000 to 4,900 tonnes of rabbit meat annually. Development efforts require an understanding of the socio-economic and institutional factors and relate these to the communities' adoption trends when exposed to a new promising agricultural technology aimed at household food security (Frimpong, 2009). The purpose of this study was to identify the socio-economic factors that determine the commercialization of rabbit production among rural communal farmers in Mt Darwin district, Zimbabwe. In that regard, the study's specific objectives were in twofold, namely: (i) to examine the socio-economic profile of smallholder farmers in rabbit production and (ii) to assess the effects of socio-economic factors on commercialization of rabbit production among smallholder farmers in Mt Darwin district, Zimbabwe.

METHODOLOGY

Study area

The study was carried out in Mt Darwin District located in northern Zimbabwe (Figure 1) while wards 8, 9, 17 and 36 were selected as study area. It is within an agro-ecological zone which receives an annual total rainfall between 550 and 700mm, with an annual temperature range from 25 to 36 ^{o}C (Moyo *et al*., 1993). Agricultural production is mainly rain fed. But few selected smallholder farmers are incorporated into existing irrigation schemes. The total population of the Mt Darwin district is 211, 919 people (ZIMSTATS, 2012).

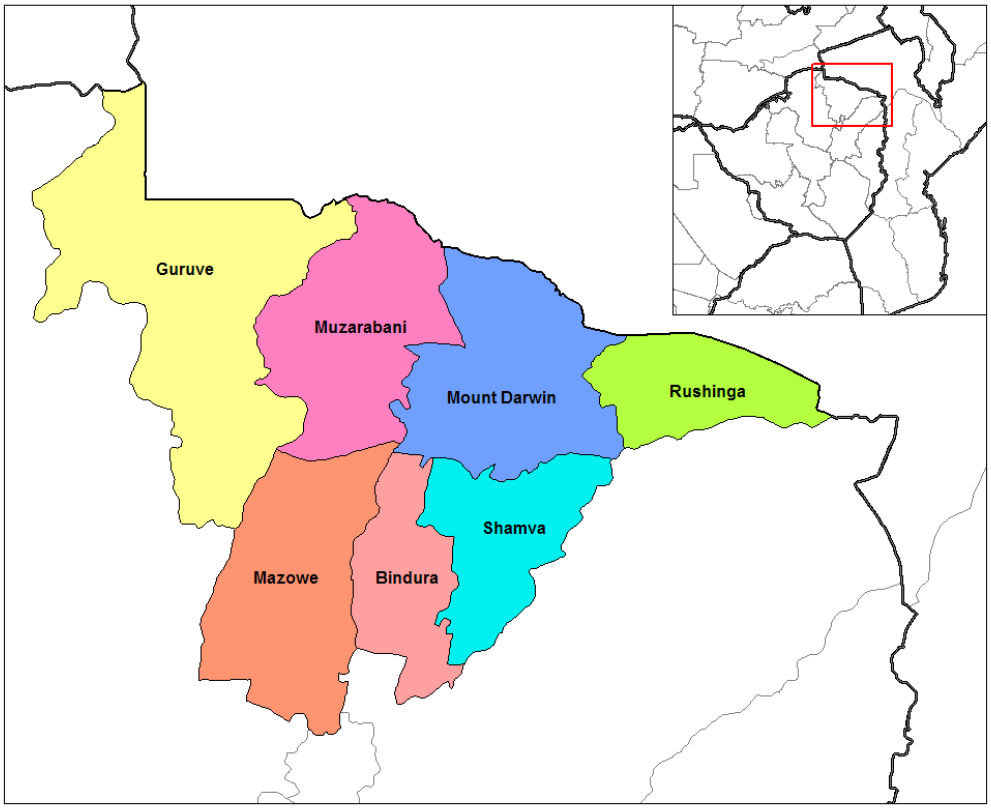

Figure 1: Study area location map showing Mt Darwin District, northern Zimbabwe

Sampling design and sample size

Four wards were purposively sampled out of the thirty-four (34) wards due to their intensity of rabbit farming. From the selected wards, the respondents were then selected using the snowball sampling technique. Each village head was requested to identify a rabbit producer who would in turn identify others. By obtaining referrals in succession, this process was carried out in waves and all rabbit farmers were identified in the selected wards. A total of 85 rabbit producers were identified and this was used as the sample for the study.

Sources of data

Both primary and secondary data were used for the study. The primary data were collected with the aid of a questionnaire. The questionnaire was structured to collect information on the demographic characteristics, socio-economic situation of the respondents, local peoples' perception on rabbit production, rabbit production and its contribution to household income and food security, general management of the rabbits, marketing and profitability of the enterprise. The secondary data were collected from records kept by extension agents and developmental non-governmental organizations. In addition, key informant interviews were held with agricultural extension agents.

Analytical tools

The data were analyzed using descriptive statistics and multiple regression analysis. To ascertain the socio-economic determinants of commercial rabbit production, a simple multi-linear regression model was used. The function is stated implicitly as:

$$Y_1 = f(X_1, X_2, X_3, X_4, X_5, X_6, X_7, X_8, X_9)$$

Where:
Y = Rabbit commercialization defined as the total number of rabbits produced by the farmer per year
X_1 = AGE being the age of the farmer in years.
X_2 = Gender of the farmer with 1 for male and 0 otherwise.
X_3 = ES being education status of the farmer and is a categorical variable with 1 for illiterate; 2 for primary level education; 3 for secondary level education and 4 for tertiary level education.
X_4 = AT being agricultural training attained by farmer and is a categorical variable with 1 for none, 2 for master farmer training; 3 for certificate training; 4 for diploma training and 5 for degree training. It is expected to positively influence rabbit production.
X_5 = EXPRBT being experience of farmer in rabbit farming. It has 4 categories: 1 for 0-5 years farming experience; 2 for 6-10 years farming experience; 3 for 11-15 years farming experience, and 4 for more than 15 years farming experience. It is expected to positively influence rabbit production.
X_6 = EXTCONT this refers to the number of days of contact with agriculture extension services the farmer

had within the year. It is expected to positively influence rabbit production.

X_7 = P being the price at which the farmer sells his or her rabbits. It is expected to positively influence production.

X_8 = MKTAVAIL being availability of markets. It is a dummy variable with 1 for a readily available market and 0 for otherwise. It is expected to positively influence rabbit production.

X_9 = LANDSZ. This refers to land size cultivated by the household measured in hectares (ha). It is a continuous variable and is expected that the larger the land size cultivated, the more feeds there is and the more rabbits produced.

RESULTS AND DISCUSSION

Socio-economic characteristics of rabbit farmers across the study area

Age of the majority of respondents (90.6%, *n* = 77) ranged from 30 to 60 years and 1.2% (*n* = 1) were over 60 years. However, also a few (8.2%, *n* = 7) of them were less than 30 years old (Table 1). The results of this study revealed that most people in the study area are well educated as 31.8% (*n* = 27) of the inhabitants had received secondary education, 44.7% (*n* = 38) of the respondents received only primary education. Only 4.7% (*n* = 4) of respondents had tertiary education and 18.8% (*n* = 16) of them had no education. Majority of respondents had received no form of agricultural education (72.9%, *n* = 62) while the minority had received a form of agriculture education (28.1%, *n* = 23). Age, education and agriculture education variation factors likely influence peoples' attitudes towards adoption of rabbit production as a livelihood activity for household food security. The study results indicated that the majority of households in Mt Darwin, northern Zimbabwe benefited from home consumption of rabbit meat and few from sale of rabbits, although the extent varied among households . On average, only 1% of the rabbit producers sold more than 100 rabbits per year, 9% between 50 and 100 rabbits and 90% between 0 and 50 rabbits. Small numbers in rabbit sales are an indicator that most rabbit producers were subsistence farmers.

Table 1: Distribution of respondents according to socio-economic characteristics

Variable	Frequency	Percentage	Mean
Age (years)			
Below 20	0	0.0	
21-30	7	8.2	
31-40	25	29.4	
41-50	34	40.0	41.5
51-60	18	21.2	
Above 61	1	1.2	
Gender			
Male	69	81.2	
Female	16	18.8	
Marital status			
Married	66	77.6	
Separated	2	2.4	
Divorced	3	3.5	
Widowed	14	16.5	
Household Size			
1-5	40	47.1	
6-10	44	51.8	6
11 and above	1	1.1	
Education Status			
Illiterate	16	18.8	
Primary	38	44.7	
Secondary	27	31.8	
Tertiary	4	4.7	
Agriculture Education			
None	62	72.9	

Master Farmer Certificate	15	17.6	
Agricultural Certificate	4	4.7	
Agricultural Diploma	3	3.5	
Agricultural degree	1	1.3	
Farm size(ha)			
0.1-1	34	40	
1.1-2	45	52.9	2.06
Above 2ha	6	7.1	
Rabbit Farming experience (years)			
0-5	31	36.5	
6-10	43	50.6	
11-15	7	8.2	
Above 15	4	4.7	

Determinants of commercialization of rabbit production among smallholder farmers in Mt Darwin, Zimbabwe

Results on regression analysis on which nine selected predictor variables were used to determine their influence on total number of rabbits produced per year, which is linked to viability of annual rabbit productivity, a proxy to commercialized rabbit production in Mt Darwin, Zimbabwe are presented in Table 2. The regression model was significant ($p < 0.05$) for agricultural extension service delivery, rabbit pricing, agricultural education and experience in rabbit keeping, whereas, the other variables namely; education status, market availability, gender of respondent, age and total land size did not significantly affect commercialization of rabbit production in Mt Darwin, Zimbabwe.

Table 2: Regression analysis output depicting the influence of selected variables (predictors) towards viability of rabbit production in Mt Darwin, Zimbabwe

		Unstandardized Coefficients		Standardized Coefficients		
		B	Std. Error	Beta	*t*	Sig
	(Constant)	24.969	28.878		.865	.390
	Age of respondent	-.683	.416	-.167	-1.641	.105^{NS}
	Gender of respondent	4.126	9.721	.043	.4240	.672^{NS}
	Total land size	6.754	5.235	.134	1.290	.201^{NS}
	Experience in rabbit keeping	11.422	5.301	.280	2.155	.034*
	Education status	-8.449	7.293	-.176	-1.158	.250^{NS}
	Agric education	28.979	7.930	.616	3.654	.001*
	Rabbit price	43.280	12.590	.528	3.438	.001*
	Market availability	-.318	7.863	-.004	-.040o	.968^{NS}
	Extension visits	11.719	4.125	.304	2.841	.006*
	R square	0.310				
	Mean dependent variable	67.823				
a. Dependent Variable: Total number of rabbits produced						

*denotes significance at $p < 0.05$, NS – not significant; $\beta 0$ - the intercept of the regression line

Level of agricultural education was an important factor influencing rabbits produced. It had a significant value of $p = 0.001$ and a beta coefficient value of 28.9. If agricultural education improves by one unit, (level of education) it would cause an increase in number of rabbits produced by almost 30 rabbits per household. This was consistent with our *apriori* expectations. Farmers with agricultural training are better informed on production and market linkages and hence are in a better position to operate viable commercialized rabbit production enterprise. Agricultural extension service delivery is the other variable that had a significant effect in explaining rabbit production. It had a significant value of $p = 0.006$ and a beta coefficient of 12. The total number of rabbits produced per year increases by 12 with one unit (number of visits) increase in the number of visits by an agricultural extension worker. Therefore if rabbit farmer-extension agent contact is increased, then production of rabbits is likely to improve (Teressa, 1997; Wolday, 1999). Farmers who had more visits by agricultural extension workers had more rabbits stock and were commercially oriented in rabbitry as compared to those who were visited less and not at all. This finding is

consistent with several studies (Legesse, 1992; Mulugeta, 2000; Appiah *et al*., 2011). Agricultural extension service, farmer trainings and other communication media effectiveness are thus important factors influencing how rabbit farmers can take up rabbit farming as a business (Bernet *et al*., 2001; Teklewold *et al*., 2006). A research by Appiah *et al.* (2011) revealed that agriculture extension contact had a significant effect on the adoption of rabbit technologies in Ghana.

Experience in rabbit production is also another factor that was found to be significant to explaining why rabbit production is not done at commercial level in Mt Darwin, Zimbabwe. The predictor had a significant value of $p = 0.034$ and a coefficient value of 11.4 indicating that as the experience of farmers is increased by one unit, production of rabbits by farmers would also increase by 12. As more experience in rabbit farming is gained by the farmer, rabbit production is expected to improve. In this case the average number of years of rabbit keeping is 6 years. Agricultural extension service delivery as a driving force to agribusiness is considered very important especially in rural poverty reduction and towards improved livelihoods for the rural households (Maliyanaarachchi and Bandara, 2003).

Rabbit price was found to be significant and positively affect the number of rabbits produced per year. The rabbit price variable had a significant value of $p = 0.001$ and a coefficient value of 43.3. This means that if rabbit price was to increase by one unit (a dollar), the production of rabbits per year would increase by 43. Rabbit price is therefore a critical factor that determined whether rabbit farmers can increase their rabbit population numbers for commercial production in Mt Darwin, Zimbabwe. The results on rabbit price variable are consistent with our *apriori* expectations as suggested in our present study. Profitable enterprises by their nature, aim to look at ways that cut costs and become efficient with a viable selling price. When a business promises only a small percent rise in profit, farmers can probably not even distinguish that it is advantageous. Availability of a market coupled with good pricing of a product can make an enterprise not only viable but very profitable and commercialized (Son, 2008).

However, the results of this study highlighted that the following factors; gender, age, education status, land size and market availability were not significant in explaining why smallholder rabbit production is not being commercialized in Mt Darwin, Zimbabwe (Table 2). These factors can therefore not explain why farmers are not increasing rabbit numbers and its production to commercial farming status. *Apriori* expectations were that market unavailability would impact negatively on number of rabbits produced. The result of the regression is consistent with the *apriori* expectations. Total land size was expected to have significance in explaining the number of rabbits produced per year. This was so because the expectation was that the larger the total land size cultivated by the farmer, the more crop residue and produce would be produced and so the farmer would be in a position to produce more rabbits as he or she will be able to feed and provide their needs from own farm rabbit feedstock formulation. However the results of the regression showed that land size had no significance in explaining the number of rabbits produced by farmers in the study area. Age and gender was found not significant in explaining why rabbit production is not being increased in the study area. The regression results in Mt Darwin Zimbabwe showed that household head, gender and age of household head do not affect the number of rabbits produced by a particular household.

Implications for agricultural management

Through agricultural education and proper agricultural extension service delivery, in which the nutritional protein value of rabbit is emphasized as ideal for HIV/AIDs patients, smallholder farmers are destined to realize the benefits brought by rabbit production (Cheeke, 1986; Owen, 1976). As noted in the present study, small livestock production like rabbitry is uniquely positioned to make a major contribution to addressing household poverty given the multiple roles that rabbits can play in the provision of household food nutrition security and the generation of income through commercialization of rabbit production as well as related rabbit production value chain components like supporting integrative practices (example gardening and vermiculture) and potential local markets for by products like tanned skins and rabbit manure as organic fertilizer which could supplement farm revenue.

Smith (2005) on the other hand suggests a 50-100 operation to be a part-time enterprise and a full time enterprise to consist of 600 does and 60 bucks. Appiah *et al.* (2011) noted that commercial production for communal farmers should be around 100-150 rabbits. However, one factor found to be limiting to industrial development is negligible government support to the rabbit industry. This is common in most developing countries and Zimbabwe is no exception as highlighted by the findings of the present study. Commercialization of any enterprise is a very important aspect of expanding a business. Farmers are highly prepared to commercialize rabbit production if all other socio-economic factors of production are made conducive. On average across the study area, 90.6% ($n = 77$) of the study respondents agreed that they can adopt commercial rabbitry farming as a business if socio-economic aspects like; access to credit loans for working capital, commercialized market-led rabbit meat and fur industry with improved rabbit price and agricultural extension service delivery are addressed (Appiah *et al*., 2011). Elsewhere in Zimbabwe, capacity building of smallholder farmers through agricultural extension service delivery in market-led agriculture production proved to improve household food and nutrition security for the targeted household around Mutare urban and peri-urban area (Mashapa *et al*., 2014).

CONCLUSION AND RECOMMENDATIONS

Rabbitry was found to be mainly a subsistence enterprise in communal areas of Mt Darwin, Zimbabwe. It can be concluded that socio-economic factors hindering commercial rabbit production enterprise in Mt Darwin, Zimbabwe were lack of agricultural extension service delivery, low agricultural education exposure to rabbit farmers, lack of experience in rabbitry and low rabbit price. The present study revealed that farmers can adopt commercial rabbitry farming as a business if these limiting socio-economic aspects are addressed. It is therefore recommended that the Zimbabwe national government and related national governments should provide a policy environment for the agricultural sector to invest in agro-industries that deal with the value chain components of rabbitry.

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COMPETING INTEREST

I declare that amongst all the four authors, there are no competing interests.

AUTHORS' CONTRIBUTION

Ms Deliwe Sylvester: She is the primary researcher and author. She did the data collection, analysis and drafting of the manuscript.
Mr Clayton Mashapa: Provided overall guidance in drafting the manuscript, review of related literature and is also the corresponding author.
Mrs May Mrema: She is the main supervisor and mentor. Assisted in research design and data analysis.
Dr Lighton Dube: He is the co-supervisor. Assisted in the research design and review of data collection instruments, data analysis and review of draft manuscript.

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