Print ISSN: 2233-4165 / Online ISSN: 2233-5382
doi: http://dx.doi.org/10.13106/jidb.2014.vol5.no2.29.

Market Opportunities and Constraints Confronting Resource-Poor Pig Farmers in South Africa's Eastern Cape Province*

James Madzimure**, Ntombizodwa Bovula***, Grace P.K. Ngorora****, Obert Tada*****, Shelton M. Kagande******, Archibold G. Bakare*******, Michael Chimonyo********

Received: August 01, 2013. Revised: April 27, 2014. Accepted: June 12, 2014.

Abstract

Purpose - The study aimed to evaluate the market opportunities and constraints confronting resource-poor pig farmers in South Africa.

Research design, data, and methodology - Information was collected from 292 households in three municipalities through interviews with key informants. The data collected included socio-economic characteristics, major market channels, prices for different pig classes, average weight of the pigs on sale, number of pigs sold annually, and preferred meat quality attributes.

Results - In Ngqushwa, 96% of respondents sold pigs as compared to Elundini (81%) and Ntabankulu (65%). Less resource-poor households and those with market-oriented production had large herdsizes ($P < 0.05$) when compared to more resource-poor farmers. The probability of selling pigs was high for the backyard production system and educated farmers. For all farmers, opportunities included high pork demand, good prices, employment creation, and a niche market for organically produced indigenous pork. Constraints include disease, feed shortages for large herds, distances to formal markets, lack of training, and drugs.

Conclusions - Constraints outnumbered opportunities for the resource-poor pig farmers

Keywords: Market, Opportunity, Constraints, Communal Pig Farmers.

JEL Classifications: F31, F47, L83, L88.

1. Introduction

The prime purpose of rearing pig is to provide pork. Thus, pig production is preoccupied with the quality of the pork and the efficiency of its production (Kyriazakis & Whittemore, 2006). Due to rising income, urbanization and globalization profound changes in the pork consumption habits of an increasing number of people have been noted (Tuyen et al., 1998). Generally, pigs are of high economic importance because of their contribution to human nutrition and their role in agricultural production systems. Pigs may also function as savings and insurance communal production systems of many developing countries (Halimani et al., 2008). Furthermore local pig genotypes are used as assets and a means of improving livelihoods of resource-poor farmers (Druker & Anderson, 2004; Mhlanga, 2002).

Like in any animal production system feeding costs for pigs are extremely high, and under communal farming conditions, feed resources are scarce and even if available price are prohibitive. However, local pigs are generally easy to feed, because they are hard and can survive and reproduce on low plane of nutrition (Holness, 1991). Communal farmers generally raise pigs in small herds using family labour and local available feed stuffs. In general, local pigs are scavengers and have a higher capacity to utilize fibrous feed. They obtain their feeds from fields, woodlands, human food by-products and waste

* We acknowledge University of Fort Hare's Govan Mbeki Research and Development Centre for providing research funds.

** Corresponding Author, Chinhoyi University of Technology, Department of Animal Production and Technology, P. Bag 7724, Chinhoyi, Zimbabwe. E-mail: madzimurej@gmail.com, jmadzimure@cut.ac.zw.

*** University of Fort Hare, Department of Livestock and Pasture Science, Faculty of Science and Agriculture, P. Bag X1314, Alice, 5700, South Africa.

**** University Of Fort Hare, Department of Development Studies, P. Bag X1314, Alice 5700, South Africa.

***** Chinhoyi University of Technology, Department of Animal Production and Technology, P. Bag 7724, Chinhoyi, Zimbabwe.

****** University of Zimbabwe, Department of Animal Science, P.O Box MP167, Mt Pleasant, Harare, Zimbabwe.

******* University of KwaZulu-Natal, Discipline of Animal and Poultry Science, P. Bag X01, Scottsville 3209, Pietermaritzburg, Republic of South Africa.

******** University of KwaZulu-Natal, Discipline of Animal and Poultry Science, P. Bag X01, Scottsville 3209, Pietermaritzburg, Republic of South Africa.

(Chikwanha et al., 2007; Taylor & Roese, 2004).

Lack of marketing facilities imposes a serious constraint on the marketing of pigs (Mahabile et al., 2002). Marketing consists of the commercial functions involved in transferring of goods and services from producers/sellers to consumers/buyers (Kwon et al., 2007; Branson & Norvell, 1983). Essentially, it is the process of creating or directing an organization to be successful in selling a product or service that people not only desire, but are willing to buy. Marketing is not just the final transactions of receiving a cheque. The acts of buying supplies, renting equipment, paying labour, advertising, processing, distribution and selling are all part of marketing. It is also concerned with anticipating the customers' future needs and wants, which are often discovered through market research (Branson & Norvell, 1983). An improvement in pig productivity and marketing especially in the local sector could improve the livelihoods of the resource-poor farmers (Hall, 1998). Wealth is disproportionately distributed among communal households, which impact negatively on livestock management and efficiency of production in general. The level of wealth of the household significantly relates to the household ability to cope with constraints (Langyintuo & Mungoma, 2006) and maximise on opportunities in the pork industry. The objective of this study was to evaluate market opportunities and constraints faced by less poor and resource-poor pig farmers in the Eastern Cape Province of South Africa

2. Literature Review

The average gross value of pig products for the past 10 years was R1 763 million (DAFF, 2011). The South African Pork Producers' Organisation (SAPPO) is the official mouthpiece of commercial pork producers in South Africa. This organisation serves the producers and liaises with various sectoral organisations in the value chain, government and international interest groups. National total size of 103 000 sows is distributed across the nine provinces as follows; Northwest 20%, KwaZulu-Natal 10%, Western Cape 11%, Mpumalanga 8%, Limpopo 24%, Gauteng 11%, Free State 8%, Eastern Cape 6%, and Northern Cape 2%. The commercial pig industry consist of approximately 7 000 boars owned by around 400 pig farmers and 18 stud breeders. The industry in South Africa has 46 registered pig abattoirs that use modern technology to ensure a streamlined slaughtering process (SAPPO, 2011). The abattoirs are responsible for the slaughtering of more than 2 million pigs annually. The value chain starts at primary pig producer. The pigs are slaughtered at registered abattoirs. The meat is sold to the butcheries, wholesalers, retailers, and/or processors. The meat can be bought by consumers directly from abattoirs, butcheries, wholesalers, and/or retailers. In some cases the consumer buys live pig for slaughter and processing backyard, a phenomenon in communal areas (DAFF, 2011).

In South Africa more pork is produced than it is consumed, thus making it a net exporter. Eastern Cape and Limpopo Province did not contribute to the share of provincial pork exports to the national total since 2000 (DAFF, 2011). A high proportion of small holder farmers are found in these provinces (Madzimure et al., 2012a). Small holder farmers are around 100 and own about 25 000 sows. This sector employs about 10 000 workers, comprising of about 4 000 farm workers and 6 000 workers in the processing and abattoir sectors (DAFF, 2011). The local market is evenly distributed between fresh meat and processing meat market. This is mainly because of a highly regulated environment before early 1990s of various policies such as; controlled and uncontrolled areas, compulsory levies payable by producers, restrictions on the establishment of abattoirs, the compulsory auctioning of carcasses according to grade and mass in controlled areas, the supply control via permits and quotas, the setting of floor prices, removal scheme, etc. Since the deregulation of the agricultural marketing dispensation in 1997, the prices in the red meat industry were now determined by demand and supply forces. The peak pork price of R15.86 per kg was reached in 2008/09 and the lowest price of R8.99 was experienced in 2000/01 (DAFF, 2011).

3. Research Methodology

3.1.Study site

The study was conducted in resource-poor communal areas of Elundini, Ntabankulu and Ngqushwa municipalities in the Eastern Cape Province of South Africa. The farmers in Ngqushwa and municipality were less poor and market-oriented compared to the farmers from Elundini and Ntabankulu municipalities who were resource-poor and consumption oriented. Elundini Municipality is situated 28° 25' E; 30°26' S, Ngqushwa municipality 27° 7' E and 33° 12' S and Ntabankulu Municipality 29° 16' E; 31° 04' S.

3.2. Data collection

Data was collected from three municipalities using structured questionnaires, in depths interviews with key informants. There were four research assistants. The communities with many pigs owning households were identified with the assistance of the Extension Officer and the local leadership. The target population consisted of about 250 households owning pigs in Elundini Municipality, 200 in Ngqushwa Municipality and 100 in Elundini Municipality. The number of households interviewed in Elundini, Ngqushwa and Ntabankulu was 122, 102 and 64, respectively. The questionnaires were administered in the local vernacular *Xhosa* language using the snow ball sampling technique. The key informants were interviewed to establish the pig production trends, as a first step in designing a structured questionnaire. Wealth status was categorized during interviews with key in-

formants and was based on number of livestock species, employment or total household income. Any household owning more than five heads of cattle or more than 20 heads of small stock (sheep, goats and pigs) was considered as less poor while the other category of less privileged people was considered as resource-poor (Madzimure et al., 2012a). The information that was collected using the structured questionnaire included major market channels, pig prices for different class of pigs, average weight of pigs at sell, number of pigs sold per year and preferred pork quality attributes.

3.3. Statistical Analysis

The Generalised Linear Models procedure GLM of SAS (2006) was used to analyse effects of socio economic profiles, municipality and production system on the number of pigs sold. The average number of pigs sold per year and the price for different classes of pigs was analysed using PROC MEANS of SAS (2006). The data on market channels, time of the year pigs are usually sold, type of breed preferred in terms of pork quality, attributes preferred for pork quality, other saleable products and uses of these products was analysed using PROC FREQ of SAS (2006).

An ordinal logistic regression (PROC LOGISTIC) was used to determine the odds of household selling pigs. The logit model fitted production system, municipality, availability of housing structures for pigs, cattle and pig herd sizes, sheep, goats and poultry flock sizes and socio economic factors (gender, age, education, employment, wealth status, household size and whether the head of household was resident on the farm). The logit model used was:

$$\text{In } (P/1\text{-}P) = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_tX_t + \varepsilon$$

Where:

P = the probability of a household to sell pigs;

(P/1-P) = odds ratio, which referred to the odds of household selling pigs;

β_0 = intercept;

$\beta_1X_1...\beta_tX_t$ = regression coefficients of predictors

ε = random residual error

When computed for each predictor ($\beta_1.....\beta_t$), the odds ratio was interpreted as the proportion of households selling pigs versus those that did not sell pigs.

4. Results

4.1. Farmers Socio-Economic Characteristics

The socio-economic characteristics of respondents in the Elundini, Ngqushwa and Ntabankulu Municipalities are shown in Table 1. Almost half of the households in these municipalities were headed by married men. Most of the interviewees in Elundini, Ngqushwa and Ntabankulu municipalities were unemployed and survived on subsistence farming or social grants. There were more respondents with basic education (grade 1-7) than secondary or tertiary education in the three municipalities. The majority of the interviewees in Elundini, Ngqushwa and Ntabankulu municipalities were Christians while the remainder were African tradition worshippers.

<Table 1> Socio-economic characteristics of respondents (percentage) in municipalities

Socio-economic characteristics	Ntabankulu	Elundini	Ngqushwa
Male headed households	52	47	55
Married respondents	67	63	73
Women owning pigs	81	60	69
Unemployed respondents	79	77	80
Respondents with grade 1-7	50	55	47
Respondents that were Christians	88	84	70
Respondents living on the farm	70	85	65

4.2.Total Herd Size

Ngqushwa municipality had a highest mean household pig herd size while Elundini municipality had the least <Table 2>. There was a significant difference in total herd size in the three municipalities. Gender of head of household, marital status, occupation, religion, production, system and farmer's place of residence had no effect on total pig numbers or number of breeding females.

4.3. Households Selling Pigs

The odds ratios for various factors affecting the selling of pigs are shown in Table 3. Farmers raising their picks on backyard production system were likely to sell more pigs than those relying on free range system (odds ratio = 2.164). The next important factor was the age of the head of household with young people likely to sell pigs than old people. Respondents with small herd of cattle were likely to sell pigs than those with large herd of cattle. In addition, unemployed people were likely to rely on selling cattle than the employed ones. Heads of households who were at home to manage their pigs were more likely to sell pigs than those who were away. The probability of selling pig are affected by pig production system, cattle herd size, age of head, occupation, residence and education level in order of importance.

<Table 2> Total head size for different municipalities (mean ± standard error).

Municipality	Total herd size
Elundini (resource-poor)	5,5 ± 2,33[a]
Ngqushwa (less poor)	8.2 ± 2.39[b]
Ntabankulu (resource-poor)	7.9 ± 2.59[ab]

[ab] Values with different superscript within a column differ (P < 0,05)

4.4. Market Management of Pigs

In Ngqushwa municipality had the highest percentage of respondents selling compared to Elundini and Ntabankulu municipality <Table 4>. Number of pigs sold per year, weight and price of different classes of animals were higher for the less poor respondents in Ngqushwa municipality than the other resorce-poor municipalities <Table 5>. For the resource-poor municipalities, Elundini had higher market prices for all classes of pigs than Ntabankulu municipality. Only Ngqushwa and Ntabankulu municipalities priced the breeding boar above the sow.

<Table 3> Odds ratio estimate, lower and upper confidence interval (CI) of household selling pigs

Odds of selling pigs	Odds ratio	Lower CI	Upper CI
Municipality (inland vs coastal)	0.820	0.521	1.291
Production system (free range vs backyard)	2.164	0.966	4.850
Cattle herd size (large vs small)	1.869	0.755	4.627
Goats flock size (large vs small)	0.774	0.353	1.698
Sheep flock size (large vs small)	0.815	0.300	2.214
Age of the head of household (old vs young)	1.940	0.456	8.255
Education (uneducated vs educated)	1.026	0.453	2.321
Employment (employed vs unemployed)	1.719	0.604	4.893
Residence of household head (away vs home)	1.387	0.710	2.708

The first factor in parentheses is the baseline (set to 1) for the odds ratios.

4.5. Market Opportunities and Constraints

Across the municipalities, farmers indicated that there was room to increase the spread of pig ownership through the sale of breeding stock. All farmers indicated that they were satisfied with high prices especially in Ngqushwa and they could produce pigs throughout the year unhampered. The Eastern Cape Province is very dry and there is no cropping activity going on and pig production offers opportunity for employment creation. Most farmers (65%) in resource-poor municipalities indicated that they could do value addition to pig fat by using it for cooking and softening ropes. All farmers indicated that there was room for creation of a niche market for organically produced indigenous pork through government assistance.

<Table 4> Percentage of respondents on market management of pigs by the farmers

Market management	Elundini (resource-poor)	Ngqushwa (less poor)	Ntabankulu (resource-poor)
Respondents (%) who sell pigs	81	96	65
Respondents (%) selling pigs to abattoirs	1	9	0
Respondents (%) selling pigs through community	98	89	100
Respondents (%) selling pigs in winter	93	88	92
Respondents (%) pricing pigs based on weight	97	82	88
Respondents (%) pricing pigs based on class	81	85	97
Respondents (%) selling sows	69	53	67
Respondents (%) selling boars	58	59	57
Respondents (%) selling gilts	82	72	87
Respondents (%) selling piglets	68	67	55
Respondents (%) preferring local pig pork	76	55	63
Respondents (%) who get fat from pigs	81	85	68
Respondents (%) using pig fat for cooking or softening ropes	67	36	62

There were however, concerns over the outbreak of diseases such as classical swine fever which had caused havoc in coastal Ngqushwa municipality. All farmers were concerned with erratic rainfall resulting in feed shortages for those wanting to expand their pig herds. With the exception of Ngqushwa municipality, other farmers complained about the long distances to the formal market where prices offered were better. Most farmers (80%) indicated that they had no training in pig production hence they required the Department of Agriculture to assist with reliable extension services.

<Table 5> Number of sales, slaughter weight (kg) and prices (Rands) of different pig classes

Attribute	Elundini (n = 122) Resource-poor	Ngqushwa (n = 102) Less poor	Ntabankulu (n = 64) Resource-poor
Yearly sales	3.0 (3.07)	14 (3.87)	2.6 (2.00)
Gilt sell weight	19.8 (3.94)	32.9 (13.49)	25.8 (6.73)
Boar sell weight	20.3 (5.24)	33.6 (13.92)	28.4 (8.44)
Weaner price	137.7 (67.68)	348.9 (412.48)	94.0 (62.29)
Gilt price	466.8 (275.98)	621.4 (393.60)	220.0 (164.32)
Sow price	786.8 (395.68)	1223.1 (663.8)	370.8 (264.15)
Boar price	784.5 (416.80)	1252.5 (580.83)	420.6 (400.00)

Within the table, figures in parentheses represent the standard deviation

There were however, concerns over the outbreak of diseases such as classical swine fever which had caused havoc in coastal Ngqushwa municipality. All farmers were concerned with erratic rainfall resulting in feed shortages for those wanting to expand their pig herds. With the exception of Ngqushwa municipality, other farmers complained about the long distances to the formal market where prices offered were better. Most farmers (80%) indicated that they had no training in pig production hence they required the Department of Agriculture to assist with reliable extension services.

5. Discussion

Most respondents across all municipalities were unemployed hence pigs offered opportunity for development through empowering women and reducing unemployment or over reliance on social grants. Most unemployed respondent were unable to keep many pigs since they do not have money to buy feed and drugs for their pigs. Resource-poor farmers who keep these pigs have tendency to keep the pig populations low in order to match available feed resources (Chiduwa et al., 2008; Mashitise, 2002). The employed farmers keep more pigs because they can afford the feed and the drugs to treat the pigs.

The majority of respondents had basic education and they lacked animal husbandry skills and ability of network so that they can increase herd size and secure a reliable and better paying market. Access by communal farmers to radios, televisions and internet is still limited. In most cases information is broadcasted and written in English. This makes the information of lesser benefit to the majority of communal farmers who understand mostly the local Xhosa language. The poor transfer of knowledge, skills and information is further manifested by limited interaction of the farmers with extension officers due to poor road networks and resources (Coetzee et al., 2004; Madzimure et al., 2012a). Training and education will further improve the capacity of the farmers and allow them to access the market for their pigs. Majority of respondent are Christian but there are some religions that prohibit the selling or consumption of pork. Although respondents where resident on the farm, pig production was less yet it was supposed to be high because the farmer has chance to manage the pigs properly. In this case pig production is low it means that there are factors affecting production such as the production system, disease outbreaks and feed availability. Respondents with larger pig herds tend to be more conscious of the benefits and necessity of paying good attention to their animals (Goska, 1995). According to Nell et al.(1998), animal agriculture has a specialized significance as it play an important role in improving the socio-economic status of sizable section of the weaker and tribal population. Livestock production is also an instrument to socio-economic change to improved income and quality of life (Atinmo & Akinyele, 1983). The less poor communal farmers are able to purchase the feed and drugs for their pigs hence high productivity and more sales. While the resource poor farmers are unable to purchase feed and drugs they feed on kitchen waste. Local pigs can forage and survive on the fibrous diets commonly found in communal areas (Chimonyo et al., 2010; Lemke et al, 2006). Also Hollness, 1991 reported that pigs are primarily scavengers, utilizing food scraps thrown away by the people.

The odds ratios for backyard production system were high because farmers were supplementing their pigs with commercial feed that contains balanced nutrients. In free range production system, the pigs are not supplemented with poor quality kitchen wastes and they rely more on scavenging (Mashatise et al., 2005). Young people (< 30 years) had more chances of selling pig because they still have the energy to balance livestock rearing with demanding crop production (Ajala et al., 2007).The young people have energy to access long distance market than old people. Respondents with large cattle herd size tended to sell fewer pigs because they could dispose cattle for cash (Musemwa et al., 2007). Those that are keeping fewer cattle are selling more pigs because the pigs are source of income to them. Educated respondents were selling more pigs maybe because they had knowledge on husbandry and marketing of their pigs. The farmers along the coast (Ngqushwa) were generally less poor and market orientated when compared to the consumption orientated farmers inland (Elundini).

There are many respondents in Ngqushwa who sold their pigs through supermarkets and they fetched higher prices than the other two municipalities. Bennison et al. (1997), argued that pigs are better managed when they make a significant contribution to the welfare of owners. There were few farmers that sold pigs to abattoir because these are located near urban centres away from communal farmers. Although farmers preferred indigenous pigs, they are discriminated against on the formal

market because of black colour which remains on carcass and smaller carcass (Chimonyo et al., 2010). In Ntabankulu, farmers were not selling their pigs to abattoir or supermarket and they are selling among themselves. Ntabankulu and Elundini are very far from the market. In South Africa there are two type of market which is the informal and formal market. The pig marketing channel is centralized pattern in which the producer's pigs are brought together in larger central and terminal markets (Barret, 1996). There, they are purchased by the wholesalers or retailers from commission agents and brokers who act as the producer's selling agents.

Most respondents preferred to selling pigs in winter because the majority do not have refrigerators. In winter the pork can be sold in the community over two days before it goes bad. Although all farmers across all municipalities indicated that they were selling pigs based on weight but they did not weigh these pigs. They use visual assessment to estimate the weights of animal. However, in Ngqushwa fewer respondents were selling less gilts because they use them as replacements stock so that they continue with their pig production. Less poor farmers in Ngqushwa did not prefer black indigenous pigs because of slow growth rate, so they prefer the cross breed and exotic pig breed (Madzimue et al., 2012a). Most of the respondents sold weaners and gilts through community market channel. The fat has value addition as is used for cooking and softening ropes and is reported to higher price than pork in some areas (Lekule et al., 1990).

There were many opportunities for pork market in all municipalities such as unmet high pork demand, room for expansion of pig projects through the selling of breeding stock, good prices, employment creation and creation of niche market for organically produced indigenous pork. Constraints faced by all farmers include disease outbreaks such as classical swine fever (Madzimure et al., 2012b), feed shortages to raise large herds, long distance to formal market, lack of training on animal husbandry and shortage of drugs to use. There is need to address all the constraints being faced by farmers through extension services offered by the Department of Agriculture and maximise on opportunities identified.

6. Conclusion

There is a difference in the market opportunities and constraints faced by the resource poor and less poor communal pig farmers. The resource-poor farmers kept less number of pigs because they cannot afford to buy the feed for the animals while less poor farmers afford to raise more pigs and channel them through the better paying formal market. Opportunities for pork market in all municipalities include high pork demand, good prices, employment creation and creation of niche market for organically produced indigenous pork. Constraints faced by all farmers include disease outbreaks, feed shortages to raise large herds, long distance to formal market, lack of training and drugs. There were more constraints than opportunities for the resource-poor pig farmers. There is need to limit on the constraints and maximise on opportunities.

References

Ajala, M. K., Adesehinwa, A. O. K., & Mohammed, A. K. (2007). Characteristics of Smallholder Pig Production in Southern Kaduna State, Nigeria. *Journal Agricultural Environment Science,* 2 (2), 182-188.

Antinmo, O., & Akinyele, O. (1983). *Nutrition and food Policy of Nigeria.* Kuru, Jos: National Institute for Policy and Strategies Studies.

Barret, C. B. (1996). Market Analysis Methods: Are Our Enriched Toolkits Well Suited to Enlived Markets? *American Journal of Agricultural Economics,* 7, 825- 829.

Bennison, J. J., Barton, D., & Jaitner, J. (1997). The Production Objectives and Feeding Strategies for Ruminant Livestock Owners in Gambia: Implications for Policy Makers. *Agricultural System,* 55, 425-444.

Branson, E. R., & Norvell, G. D. (1983). *Introduction to agricultural marketing.* New York, USA: McGraw-Hill, Inc.

Chiduwa, G., Chimonyo, M., Halimani, T. E., Chisambara, S. R., & Dzama, K. (2008). Herd Dynamics and Contribution of Indigenous Pigs to the Livelihoods of Rural Farmers in a Semi-Arid Area of Zimbabwe. *Tropical Animal Health and Production,* 37, 333-344.

Chikwanha, O. C., Halimani, T. E., Chimoyo, M., Dzama, K., & Bhebhe, E. (2007). Seasonal Changes in Body Condition Scores of Pigs and Chemical Composition of Pig Feed Resources in a Semiarid Smallholder Farming Area of Zimbambwe. *African Journal of Agricultural Research,* 2, 468-474.

Chimonyo, M., Dzama, K., & Mapiye, C. (2010). Growth Performance and Carcass Characteristics of Indigeous Mukota Pigs of Zimbabwe. *Tropical Animal Health and Production,* 42, 1001-1007.

Coetzee, L., Montshwe, B. D., & Jooste, A. (2004). The Marketing of Livestock on Communal in the Eastern Cape Province: Constraints, Challenges and Implication for the Extension Services. *South African Journal Agricultural Extension,* 34 (1), 81-103.

DAFF, (2011). *A Profile of the South African Pork Market Value Chain, Directorate Marketing.* Department of Agriculture, Forestry and Fisheries, RSA. Retrieved March 31, 2014, from www.daff.gov.za/docs/AMCP/Porkmvcp2011-12.pdf

Drucker, A. G., & Anderson, S. (2004). Economic Analysis of Animal Genetic Resources and the Use of Rural Appraisal Methods: Lessons from Southeast Mexico. *International Journal of Agricultural Sustainability,* 2, 77-97.

Goska, D. Y. (1995). Pig Production Under Village Systems in Jama's Local Government Area of Kaduna State. Makuradi, Nigeria: A Survey Unpublished PGD Project,

University of Agriculture.

Halimani, T. E., Phitsane, P. M., Mtileni, B. J., Muchadeyi, F. C., Chimonyo, M., and Dzama, K. (2008). Factors Influencing Herd Size, Breed Preference and Production System of Genetic Resources from Smallholder Farmers in South Africa. Proceedings of the 10th World Congress on Animal Production, 23-28 November 2008, South Africa.

Hall, S. J. G. (1998). Traditional Livestock in Semi-Arid North Eastern Zimbabwe. *Tropical Animal Health and Production,* 30, 351-360.

Holness, D. H. (1991). The Tropical Agriculturalist-Pigs. Wageningen, Netherlands: Macmillan Education Limited.

Integrated Sustainable Rural Development Strategy (ISRDS) (2004). *South Africa, a Better Place to Live in.* Retrieved on December 14, 2013, from http://www.info.gov.za/oth-erdocs/isrds.pdf.

Kwon, Oh-Chul, Kim, Jin-Seong, Kim, Pan-Jun, Kim, Pan-Jin, Kim, Hong-Seop, Namkung, Suk, Park, Yeung-Kurn, Park, Chul-Ju, Park, Hyoung-Jin, Youn, Myoung-Kil, Lee, Jang-Hwan, Hwang, Hwa-Chul, & Kim, Yoo-Oh. (2007). A Note on the Unification on Retail Trade Tterminology. *Journal of Distribution Science,* 5 (2), 5-16.

Kyriazakis, I., & Whittemore, C., T. (2006). Whittemore's Science and Practise of Pig Production (3rd ed.). UK: Oxford, Blackwell Publishing Ltd.

Langyintuo, A., S., & Mungoma, C. (2006). The Effect of Household Wealth on Input Market Participation in Southern Africa. Pproceedings of the 26th Conference of the International Association of Agricultural Economist, 12-18 August, Gold Coast Convention Centre, Queensland, Australia. Retrieved January 23, 2014, from http://ageconsearch.umn.edu/bitstream/25630/1/cp06119.pd f.

Lekule, F., P., Sarawatt, S. V., & Kifaro, G. C. (1990). The Role, Performance and Potential of Indigenous Local Pigs in Developing Countries. *Tanzanian Society of Animal Production Proceedings,* 17, 79-85.

Lemke, U., Kaufmann, B., Thuy, L. T., Emrich, K., & Zarate, A. V. (2006). Evaluation of Smallholder Pig Production Systems in North Vietnam: Pig Production Management and Pig Performances. *Livestock Science,* 105, 229-243.

Madzimure, J., Chimonyo, M., Zander, K. K., & Dzama, K. (2012a). Potential for Using Indigenous Pigs in Subsistence-Oriented and Market-Oriented Small-Scale Farming Systems of Southern Africa. *Tropical Animal Health and Production,* 45, 135–142.

Madzimure, J., Chimonyo, M., Zander, K.K., & Dzama, K. (2012b). Farmer Perceptions of Classical Swine Fever Outbreak in Communal Pig Production Systems of South Africa. *African Journal of Agricultural Research,* 7(43), 5819-5826.

Mahabile, M., Lyne, M., & Panin, A. (2002). Factors Affecting the Productivity of Communal and Private Livestock Farmers in Southern Botswana: A Descriptive Analysis of Sample Survey Results. *Agrekon,* 41(4), 326-338.

Mashatise, E. (2002). A Survey of Pig Production in a Smallholder Farming Area of Zimbabwe and the Influence of Maize-Cob Based Diets on Blood Metabolites and Puberty in Mukota and Landrace x Mukota Gilts. Harare, Zimbabwe: MSc Thesis at University of Zimbabwe.

Mashatise, E., Hamudikuwanda, H., Dzama, K., Chimonyo, M., & Kanengoni, A. (2005) Socio-economic Roles, Traditional Management Systems and Reproductive Patterns of Mukota Pigs in Semi-Arid North-Eastern Zimbabwe. *Bunda Journal of Agriculture, Environmental Science and Technology,* 3, 97–105.

Mhlanga, F. N. (2002). *Community-based management of Animal Genetic Resources: A Participatory Approaches Framework.* Harare, Zimbabwe: Department of Animal Science, University of Zimbabwe.

Musemwa, L., Chagwiza, C., Sikuka, W., Fraser, G., Chimonyo, M., & Mzileni, N. (2007). Analysis of Cattle Market Channels Used by Small Scale Farmers in the Eastern Cape Province, South Africa. *Livestock Research for Rural Development,* 19 (9), 1-7.

Nell, W. T., Schalkwyk van, H. D., Sanden, J. H., Schwalbach, L., & Bester, C. J. (1998). Adoption of Veterinary Surgeon Service by Sheep Goat Farmer in Qwaqwa. *Agrekon,* 37(4), 418 – 434.

SAPPO (2011). *South Africa Pork Producers' Organisation.* Retrieved April 3, 2014, from http://www.sapork.biz/about-sappo/.

Statistical Analysis System (SAS) (2009). *Statistical Analysis System User's Guide* (Version 9.1), North Carolina, USA: SAS Institute Inc.

Taylor, G., & Roese, G. (2004). *Basic Pig Husbandry.* Tamworth: Intensive Industries Development,

Tuyen, D. K., Lich, L. B., & Trivedi, K. R. (1998). Livestock Production Situation in Vietnam and Development Orientation. International Workshop on Animal Recording for Smallholders in Developing Countries, October 20-23, India.