



Typical Zimbabwean small-scale pig production systems: A case study of Nyabane, Bulilima District, Matabeleland South Province.

Chigede, Ngavaite

Gary Magadzire School of Agriculture, Livestock, Wildlife and Fisheries Department, Great Zimbabwe University

Email: nchigede@gzu.ac.zw

Abstract

Pig production is one of the most important socio-economic activities among farmers in marginal areas who are trying to improve their limited living conditions. Due to a multitude of impediments, including poorer breeds and financial constraints among small-scale pig farmers, national pig slaughters declined by 5% in the year 2020. The Nyabane area in Bulilima district was used as a case study to evaluate the causes of poor pig production in smallholder systems. Snowball sampling technique in a mixed methods research design was employed. A questionnaire was used to collect data from pig producers, as well as observations and conversations with extension staff. Thematic approach for qualitative data and Microsoft Excel for summarizing quantitative findings were used as data analysis techniques. The extensive production system was being used among Nyabane smallholder pig farmers. Eighty percent of farmers knew when to breed their swine since they observed their pigs' heat cues. However, the average litter size was small, at only four piglets per sow every farrowing, compared to the commercial average of ten piglets per sow per farrowing. An average return to breeding time of 60 days after weaning indicated low sow productivity. Pigs were malnourished due to the fact that they were only fed low quality kitchen waste once a day. This explains the observed low body condition score of less than two against a recommended score of 3 for breeding sows. Based on the findings, the researcher suggests that the Pig Industry Board and other agriculture training institutions avails sufficient skills training to smallholder pig producers around the country with the goal of improving and refreshing on pig management aspects. Moreover, financial aid should also be made available to help those who have financial difficulties.

Key words: Bulilima, Pig management skills, Sow productivity

1. Introduction

Agriculture is the mainstay of the Zimbabwean economy contributing at least 18 per cent to the Gross Domestic Product (GDP), over 40 per cent of national exports, 60 per cent of raw materials to agro-industries as well as provide livelihood to over 70 per cent of the population (FAO, 2021). The performance of agriculture is a key determinant of rural livelihood resilience and poverty levels since it is the mainstay of livelihoods for the majority of the population, 70 percent. Agriculture under small scale farming assumes a central role in poverty alleviation



and food security in the country and across the globe at large, thus contributing to achieving sustainable development goals number 1 to 3 (United Nations, 2019). Livestock production can contribute to poverty reduction in various ways including increased food supply, source of income and a means for capital accumulation, employment opportunities and supply inputs and services for crop production (Hlophe-Ginindza & Mpandeli, 2020).

The country's agricultural sector comprises of crops and livestock rearing. Livestock rearing is an essential part of the agricultural sector due to high and increasing demands for meat amidst a booming population in the country (Zimbabwe National Statistics Agency (ZimStat), 2022). Apart from providing significant livelihood benefits and cropping services such as draught power and soil fertility, livestock is essential for risk coping, farm diversification and intensification. Livestock kept in Zimbabwe comprises mainly of beef and dairy cattle, poultry, pigs, goats and sheep. Small scale farmers essentially own the majority of the livestock: cattle at about 90%, goats 98% and pigs 80% (Mutambara, 2013). Weka et al., (2021), has it that pig production has potential of improving Sub-Saharan Africa's real per capita income reported as \$688 in 2010 compared to \$1717 of the rest of the world for most African countries where Agriculture remains the backbone of the economy. Pig farming in Africa is regarded as a fundamental means of survival and poverty alleviation, especially in rural and marginalized areas of the region. Weka et al., (2021) cements this when he avers that regardless of the decrease in the rearing of indigenous breeds due to the adoption of improved exotic breeds in most parts of Africa over the years, indigenous pigs continue to maintain their relevance as a source of food and income for rural communities and small scale farmers (Munzhelele, 2015). Pig production is an essential economic livestock activity due to better production efficiency as compared to other livestock species because of their large litter sizes averaging 10 piglets per farrowing, shorter gestation periods at ± 115 days and high demand of pork (Berihu & Tamir, 2015).

Despite the increasing demand for pigs, only an approximate 100 000 pigs are available for slaughter and processing annually (Mutambara, 2013). Hlophe-Ginindza & Mpandeli, (2020) reports that an estimated 90 percent of the farming industry, particularly in developing countries, is dominated by low skilled, smallholder farmers who lack market-orientation. All this undermines the competitiveness of agricultural producers. Pig slaughters back rolled by an estimated 5% in the year 2020 due to a number of challenges including inferior breeds and financial constraints amongst small scale farmers (Nyoni, 2021). This points to the fact that small scale pig farming is facing management challenges thereby compromising their potential to contribute immensely to poverty alleviation of the rural populace in Zimbabwe. Investigating factors responsible for poor pig production will assist in ensuring sustainable pig management practices that are beneficial to small scale farmers. Nyabane area is one of the places in Zimbabwe practicing small scale pig production with potential of empowering the youths and women in marginalized areas. However, pig production in the area has not been reported to be showing great improvements despite close to two decades of practicing it as part of their agricultural activities. It is upon this background that



this study sought to investigate the management practices and factors limiting small scale pig production in Nyabane Area, Bulilima District, Matabeleland South Province.

2. Materials and Methods

2.1 Study site

Bulilima District, one of the seven administrative Districts in Matabeleland South Province, has 22 wards and shares borders with Tsholotsho to the north, Umuza to the East, Hwange National Park to the west and an international boundary with Botswana to the south. Bulilima District lies in Zimbabwe's agro-ecological region V, which stands as one of the driest parts of Matabeleland South Province suitable for cattle and game ranching which is its main economic driver. The district is drought-prone with a mean annual rainfall of less than 400 mm, only suffice the production of drought-tolerant crops such as sorghum, millet, watermelons and some pumpkin varieties. Mopane worms (amacimbi) are also an important resource in the district and their harvesting is a major economic activity, both for subsistence and commercial purposes.

2.2 Research method

The study employed a mixed methods approach (Creswell & Creswell, 2018) collecting both quantitative and qualitative data. Qualitative research allowed the researcher to explore a wide array of social dimensions harnessing deeper insights into issues related to pig farming amongst small scale farmers of Bulilima district. The quantitative approach on the other hand acted as an excellent way of analyzing results and coming up with statistical summaries. Closed and open-ended questions were used to gather information from small scale farmers and extension officer focusing on issues such as farmer practices, available resources for pig rearing and pig productivity parameters such as mortality.

Semi structured interviews were used where the researcher recorded specific questions to be covered while leaving room for additional questions not previously anticipated to be addressed. The interview questions constituted a list of in-depth semi structured questions that sought to satisfy the objectives of the study. The questionnaire was pre-tested before used on the targeted population of the study at Nyabane area in Bulilima. The study also made use of observation techniques to gather data. This included observing the farm structures and equipment in terms of pig sties, management routines such as feeding and watering. The researcher also observed condition of the pigs in order to get a glimpse of their nutritional management.

2.3 Targeted population, sample and sampling technique

Four hundred and sixty-one farm households were the targeted population for this study and the ward 1 Agricultural Extension Officers in Nyabane area, Bulilima. The area consists of two villages namely Malisikwana with 231 households and Jama with 230 households. Snowball sampling technique was employed as the



households into pig production were dotted. Snowball sampling is chain referral sampling where an identified target individual refers other members of the targeted population(Naderifar et al., 2017). The Agricultural Extension Officer for ward 1 was interviewed before visiting the targeted farms.

2.4 Ethical Considerations

The researcher sought permission from the Local Authority at Bulilima and informed consent was obtained from the participants prior to carrying out the field research. During data gathering, the researcher adhered to ethical standards in collection and disseminating research findings. The participants also were assured of their privacy. This entailed leaving out details such as names, identity number and phone numbers. Moreover, the researcher emphasized the rights of participants on questions they were not comfortable with as well as ask to stop when they no longer felt comfortable. The researcher also refrained from probing further on issues that seemed sensitive to the participants.

2.5 Data Analysis Approach

Thematic approach for qualitative data and Microsoft Excel for quantitative findings were used. Thematic approach puts emphasis on noting, examining and recording patterns within the data. Themes were observed across data sets which are fundamental in the description of the farmers’ experiences on pig production. To decide on the themes and concepts, after familiarization the data was labeled, sorted and compared as a form of management.

3. Results and Discussions

Socio-Demographic Characteristics of the respondents

More youths, 55%, are into piggery production in Nyabane area, Table 1.

Variable	Percentages
Male	55
Female	45
TOTAL	100
Age groups	
below 25	36
25-34	18
35-44	18
45-54	10
55-64	10
65+	8
TOTAL	100
Marital status	
Single	55



Married	27
Widowed	9
Divorced	9
TOTAL	100
Literacy Level	
Primary	18
Secondary	46
Tertiary	36
TOTAL	100
Land Ownership	
Lease	9
Title Deeds	18
Communal	73
Total	100
Proportion dependent on piggery	
Full-time	64
Part-time	36
Total	100

Table 1: Socio-Demographic Characteristics of Respondents (Source: Field survey)

A high involvement of youths in piggery (55%) was noted and is of economic importance in National Development Strategy 1 (2021-2025) as youths will be able to contribute to the development of the country and attainment of vision 2030 by the government of Zimbabwe. Fifty-five percent of the respondents were male while the remaining 45% were females. Gender balance is essential in the global and national goals of doing away with the feminization of poverty. The high number of women with farms and practicing piggery in order to enhance livelihoods shows improvements in the empowerment of women through allowing them access to land and resources. The study also found that a majority of the respondents were educated pointing to the fact that these people are trainable and can understand if taught how to manage pigs.

The study further investigated land ownership of the farmers which will assist in determining the level of productivity. This is because rented space would make it difficult for a farmer to invest in constructing expensive and permanent structures for the pigs in case they have to move and look for new land to rent. Scarcity of land, as cemented by Berihu and Tamir (2015), constrains productivity as it hampers farm expansion and own feed production. Thus 73% indicated that they utilize communal land, while 18% had title deeds and the remaining 9% were operating on leased land. These findings indicate that land does not seem to be one of the major constraints of pig productivity in Nyabane area.



A higher proportion (64%) of full-time households into piggery mean that these families earn their livelihoods from pig farming and will be eager to take in assistance which uplift their standards of management.

Pig Productivity Parameters

Low productivity was evidenced in Nyabane area with an average litter size of 4,(Table 2).

Category	Frequency	Average
Sows	32	3
Boars	23	2
Gilts	13	1
Litter/piglets	44	4

Table:2 Number of Pigs in Nyabane(Source: Field survey)

Participants were asked to state the exact number of pigs currently under their management. The farmer with the most pigs had 20 while the lowest number of pigs per farmer was 2. Other farmers had 7, 12, 19 pigs on their farms. However, most pig numbers revealed that farmers in Nyabane area might be struggling to intensify their piggery projects. This is due to a number of reasons such as limited resources, poor management particularly feeding as it contributes immensely to production costs (Gombwe et al., 2022) and health issues as revealed by this study.

Both exotic and indigenous pigs were found among the Nyabane farmers. Exotic breeds such as the large white are favorable to most pig farmers due to their fast growth rate and large litter sizes(Langemeier, 2019). However, Weka et al., (2021) asserts that the exotic breeds are relatively large in size thus demand high maintenance energy resulting in the failure of smallholder farmers to participate in commercial pig-meat production. This has seen an estimated 60 % of domesticated pigs in Zimbabwe amongst small holder farmers being made up of the Mukota breed (FAO, 2002). Contrary to the exotic breeds, the Mukota pig is small in size and is able to reproduce under low nutritional needs and high fiber levels which are cheaper(Chimonyo et al., 2010). The study reviewed that 64% of the farmers in Nyabane area rear exotic breeds while 36% rear the indigenous breed.

Reproductive performance

Farmers’ knowledge on mating was assessed by the study. Being able to recognize a pig on heat is essential to farmers as this allows farmers to increase their production. Most farmers (86%) mentioned that they know when a sow is ready for mating when the vulva gets swollen and shallow. The remaining 14% noted the behavior of the boar which will be following the sow around as one of the signs that the sows are on heat and ready for mating.



The farmers further revealed that they allow their sows to return to mating between 2 weeks to 2 months after weaning. The researcher noted with concern the wide period spent by sows unproductive. This indicates that farmers need refresher courses to improve on management of sows as a wider period between weaning and re-mating reduce the sow furrowing index which is 2.3 in productive herds with good management. For improved productivity, sows should come on heat the first 10 days after weaning (PIB, 2018). All this is facilitated by improved management skills. For improved performance and piggery sustainability, there is need for continuous monitoring and mentoring of farmers, especially small scale pig producers as noted by other scholars (Matabane et al., 2015; Umeh et al., 2015).

Record Keeping

Record keeping is an essential management practice in pig production that can assist farmers to keep track of their production performance and challenges. Seventy-three percent of the farmers in Nyabane area keep records either in digital form or through hard copies like use of notebooks. Information kept was largely to do with accounting side of the pigs, including number of piglets born, mortality rate at birth and after weaning, number of sows, gilts and boars as owned within that farm. Farmers need to compute furrowing index, weaning rate and conception rate among other management type of records. This will enable farmers to assess their breeding pigs' performance and their management level of impact with reference to some performance targets recommended. Sows should have a furrowing index of 2.3 per year(Larkmead, 2022).

Average performance in the litter size was noted over a four-year period, Table 3.

Year	Average number of sows	Piglets born	Average no. of piglets born to a sow	Table 0: Piglets Birth rate Trend
2018	4	56	6	
2019	4	69	6	
2020	4	99	10	
2021	4	98	9	

ds(Source: Field survey)

The other factor compromising on performance of sows was the issue of borrowing out boars or moving sows to other farmer's household for mating services. This practice of borrowing out pigs increase the likelihood of diseases as biosecurity measures are compromised. The current findings are in line with Munzhelele, (2015) who avers that most small-scale farms do not own boars as they are used only for breeding. Poor breeding and selection practices result in challenges associated with inferior pig breeds(Madzimure et al., 2012). In order to cut



expenses and save space, small-scale farmers prefer to borrow boars for breeding from relatives and neighbors. This practice reduces sow farrowing index due to associated delays and possible missing other estrus periods. Despite the noted challenges, litter size improved in year 2020, and generally there is an upward trend when compared to the previous years, Table 3.3. This rise in growth could be due to enhanced experience by farmers on how to manage their breeding pigs. However, despite the improvement in piglets born from 2018-2021, Table 3.3, records indicate otherwise on management of the piglets and breeding sows, Table 4.

Year	Total born	Born dead	Died after weaning
2018	44	5	16
2019	69	14	13
2020	99	29	22
2021	98	14	18

Table 3: Birth and death rate of piglets from 2018 to 2021(Source: Field survey)

Large numbers of piglets born dead and piglets that died after weaning were pointers to low attention at farrowing. Records could not ascertain the causes of death as farmers were not making use of their veterinary services personnel for the area. However, mortalities at birth could be due to failure to vaccinate pregnant sows/gilts (e.g., against scouring), crushing by the mother sows, malnutrition and unhygienic farrowing environment as alluded to by other farmers. The study further found that 45% of the farmers had no heating source for the piglets which is another factor contributing to the death of the piglets while 55% use fire as their heating source.

Management Practices on Pig Production

The majority of pig farmers in Nyabane area were scored average when it comes to feeding management, Table 5.

Management activity	Above average	Average	Below average
Housing types	27	27	45
Feeding systems	18	55	27
Herd health practices	0	45	55

Table 4: Observer's perception on pig management practices in Nyabane area (Source: Field Survey)

The observation Checklist (Table 5) shows the observer's perception on management practices amongst farmers in Nyabane area.

**Housing**

Most of the pig sties in Nyabane area were recorded as below average (45%), an indication that housing was a challenge. The current findings concerning poor housing infrastructure are in line with Halimani et al., (2012) and Madzimure et al., (2012) who also reported poor housing infrastructure among small scale farmers. The observation checks list paid attention to the way the building was constructed and kept in terms of neatness, space and material used. Sties were made of bricks, stone or wood and thatched with grass or asbestos. Participants had separate pens for farrowing, growers, weaners and breeding herd. Housing is essential in pig production in order to shield the pigs from adverse weather conditions and diseases. While 55% of the participants indicated that they received assistance in constructing their pens, 18% did not receive any assistance while 27% partly received assistance. Those who received assistance pointed out that they received financial and physical assistance from friends and relatives.

Feeding System

Only 18% of the surveyed farmers had feeding systems above average. The majority of the farmers, 55%, were observed to be on average. Farmers fed their pigs once a day and fed them only crop residues hence leading to poor pig body condition observed among the majority. Ideally pigs perform better when split-fed, usually twice per day, than once off per day feeding. Pigs must essentially eat approximately 4% of their body weight per day consisting of carbohydrates, fats, proteins, minerals and vitamins in order to meet the required daily needs (Osborne Livestock Equipment, 2019).

Farms awarded the average score on feeding system of their pigs fed their pigs twice to thrice a day and were fed crop residues and cabbages while above average pigs were fed kitchen left overs coupled with crop residue and vegetables which tends to be varied nutrition wise due to the variation in foods provided. These pigs were also said to be given commercial feed every now and then. The study reviewed that small scale pig farmers feed their animals with available feed instead of the required feed which changes with different pig's physiological state (Magowan et al., 2016). A higher protein level is critical for young actively growing pigs and low protein for mature pigs.

A body condition scoring (BCS), on a scale of 1 to 5 (1 being very thin and 5 very fat), reviewed that 55% of the pigs were thin, 10% average, while 35% were fat. These findings augment well with Chimonyo et al., (2010), view point that feed is one of the major challenges faced by small scale farmers practicing pig production. Farmers who keep the exotic breed, large white, were failing to meet the nutritional requirements of the pigs hence low performance noted.

Changes in dietary needs and quantities are most prevalent during the later stages of pregnancy which helps pigs conserve nutrients for ensuing lactation (Blavi et al., 2021). The increased needs are for proteins, vitamins and minerals. Mature sows gain between 30 - 35 kg while gilts gain between 40 - 45 kg during pregnancy. However, farmers should be careful in regulating feed to ensure that sows and gilts do not become either obese or



malnourished. Feed allowance is usually calculated as 2.5 - 3 kg/100 kg body weight plus at the rate of 0.2 kg feed per piglet with the lactating sow, however, environmental conditions may alter feed requirements.

Health Management

Herd health practices were recorded at 55% below average and 45% average. These scores were awarded with reference to biosecurity measures being implemented on farms including vaccination, dosing, and dipping of the pigs. Fifty-five percent of the participants vaccinated their pigs while 45% of the participants never vaccinated their pigs. Pigs that are not vaccinated are prone to suffer from various diseases such as scouring, respiratory, muscle and skin diseases thereby affecting productivity (Berishaet al., 2015). Diseases have been ranked as one of the most prevalent and fundamental factors affecting pig productivity amongst small scale farmers (Berihu et al., 2015). Farmers with a below average score were not vaccinating their pigs and have no biosecurity measures such as foot and wheel baths, sanitizing tools and disinfecting the sties while farmers with an average score pointed out that they were vaccinating their pigs once in a while thus they skip some vaccination stages and have some biosecurity measures in place such as fencing and functional foot baths in place. Farmers further mentioned that the most prevalent diseases were skin diseases (particularly mange) at 91% while the other 9% was for diseases such as muscular and respiratory diseases.

Cleanliness among surveyed farmers was on the low side as indicated by a low frequency of cleaning pens, Table 6.

Cleaning frequency	Percentage
Never	18
once a week	27
twice a week	45
once a month	9
Total	100

Table 6: Cleaning Routine of Pigs and Pen (Source: Field Survey)

In order to reduce disease prevalence and ensure healthy pigs, pigs must be dipped at least once fortnightly as well as clean sties on a daily basis. The observed low dipping frequency points to the challenge of mange (skin diseases) reported by the majority of the farmers. However, low cleaning frequency could be associated with aridness of the area resulting in farmers having to walk long distances to access water for use in their projects.

Marketing

Farmers in Nyabane practice pig production in order to enhance their livelihoods. Pigs act as a source of income and diet supplement. Reasons given by farmers for keeping pigs include earning a living, financial gain, affording family basics, and school fees payment. The farmers reported that they sale their pigs at the local market or



butchery. Elsewhere, Fakudze et al., (2021) argues that small scale pig producers lack access to high value markets and available markets use this to their advantage and thus become generally exploitative, collusive and economically inefficient. The people with access to high value markets are big commercial pig farmers that supply pork to supermarkets and companies. Forming small scale farmers' unions may help to lessen this marketing challenge.

Farmers reported an average pork market price in the range USD\$3.50-3.80 per kg. Pigs were being sold at various age groups from weaners to porkers' stage. The market share was reported as 50% for the local butcheries, 27% direct local consumers while 23% were to other farmers in the District.

4. Conclusion and Recommendations

Farmers in Nyabane area, Bulilima district, keep pigs on a small-scale basis. Performance was noted to be on the low side due to a number of reasons, chief among them being poor nutrition and lack of a health program by farmers. High mortalities, low BCS and lack of biosecurity measures were noted challenges among the farmers. This has seen high mortality rates of piglets which are also being exacerbated by poor management of pregnant sows and housing infrastructure which fail to protect the piglets from adverse weather conditions.

The majority of small-scale farmers might be in the same situation as Nyabane farmers and thus require constant production training courses and on the farm training where farmers can adopt a look and learn approach. Farmers need to be trained the basics of ration formulation to be able to optimally use on-farm feed resources. Farmers need to be encouraged to form pig farmers' association groups which will encourage sharing of knowledge and skills on proper management of pigs. Such networking might ensure that farmers unite to assist each other and also sourcing for funds. The Pig Industry Board and other agriculture training institutions should continuously avail sufficient skills training to smallholder pig producers around the country with the goal of improving and refreshing on pig management aspects. Moreover, financial aid should also be made available to help those who have financial difficulties.

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