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COLLEGE OF AGRICULTURE AND VETERINARY SCIENCES

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**PROJECT TITLE: IMPACT OF TRADITIONAL DAIRY FARMING ON MILK
PRODUCTION**

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DECLARATION

This dissertation is submitted to the University of Nairobi in partial fulfillment of the requirements for the degree of Bachelor of Veterinary Medicine. It is my original work and has not been submitted to any other University for academic Award.

Signed: í í í í í í í í í í íDate:í í í í í í í í í í í í í í í í

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Supervisor

This dissertation has been submitted for examination with my approval as the university supervisor.

Signed: í í í í í í í í í í íDate:í í í í í í í í í í í í í í í í

Prof Charles Gachuri

DEDICATION

To the giants of the previous generation who achieved so much and to the present and next generation of whom so much is expected.

ACKNOWLEDGEMENT

I have taken effort in this project. However, it would not have possible without support of many individuals and organizations. I extend my sincere thanks to all of them. I am highly indebted to my supervisor Prof Charles Gachuri for his patience, guidance and supervision as well as providing information for completion of this project.

I would like to express my special gratitude to the dairy farmers I interviewed for their time and information.

Lastly my appreciation goes to my parents and colleagues who helped in developing the project and all who have willingly helped with their abilities.

ABSTRACT

The purpose of the study was to investigate the impact of traditional dairy farming on milk production. Data was collected in two counties where production systems were predominately intensive or extensive. To compare milk productivity under the two systems; data was collected from 25 farms in Kabiyet region, Nandi County and 15 farms in Ndumboini area, Kiambu County. Data was collected through administration of questionnaires. Parameters collected were milk yield per lactation period, age at first breeding and calving and types of feed utilized in the farms.

Results revealed that an average of 1525 and 1215 litres of milk per lactation period in extensive and intensive farms respectively. However, this trend could improve to more than 2000 litres per lactation period with better management programmes and feed supplementation. Mean age at first breeding and calving will reduce to 15 and 24 months respectively with improved nutrition. It can be concluded that traditional dairy farming results in low milk productivity. It is recommended that farmers practicing traditional dairy production be encouraged to adopt modern techniques.

1. INTRODUCTION

Historical Information

Commercial dairy farming in Kenya was started between 1900 to 1953 by white settlers who imported into the country dairy breeding stock from Europe with the aim of initiating a large scale dairy production for urban and export market (Peeler and Omere 1997; Ngigi 2004).

Indigenous Kenyans were not permitted to engage in commercial agriculture until 1954 when a colonial policy paper, the Swynnerton plan, allocated them quota (Peeler and Omere 1997; Wakhungu 2001). Dairy farming was then shifted to small holdings and was characterized by cross breeding the exotic breeds with East African Zebu (Wakhungu 2001; Ngigi 2004). Cross breeding combined milk production potential of the exotic breeds with disease resistance ability of the Zebu (Muriuki et al 2003; Owen et al 2005).

In the immediate post-independence period, rapid subdivision of land from white settlers to small holder farmers was done (MOLFD 2006). By 1965, the cattle population in large scale farms had declined to 250,000 heads of cattle from 400,000 in 1961 (Wakhungu 2001). In order to encourage small holder dairy production, the post-independence government established a favorable policies that subsidized inputs of animal health services, production and breeding (Muriuki et al 2003; MOLFD 2006). The government support resulted in rapid increase in milk produced nationally and shifted commercial dairy production from large scale to small scale (Muriuki et al 2003; Owen et al 2005).

Current status of dairy in Kenya

Currently the dairy herd in Kenya is approximately 3.5 million heads of cattle composed of pure bred Holstein-Friesian, Ayrshire, Guernsey, Jersey and their crosses (Wakhungu 2001). The livestock sector contributes about 10% of Kenya Gross Domestic product and over 40% of Agricultural Gross Domestic product (MOLFD 2006). Dairy production in Kenya is concentrated with the medium to high potential arable zones with 48% of all exotic dairy cattle located in the Rift Valley, 30% in Central province, 15% in Nyanza Province, 4% in Eastern province and 3% in Nyanza province. (Wakhungu 2001; MOLFD 2006).

Dairy farming is categorized into small scale, medium scale and large scale production systems (Owen *et al.*, 2001, MOLFD 2006). Small scale produces over 80% of commercial milk from 2 to 3 dairy cows on 1 to 2.5 hectares of land (Wakhungu 2001; Muriukiet *al* 2003; Owen *et al.*, 2005). Although small holder production system in Kenya contribute 80% of the total milk produced and marketed, the dairy milk production per lactating cow is low and is on average about 7 litres per day (Mutigaet *al.*, 1994; Owen *et al.*, 2005; MOLFD2006). Major constraints to performance in the small holder systems have been attributed to poor housing, inadequate feed quantity and quality, poor disease control, lack of breeding programs and lack of records (Mutasa and Munyua 1992; Mutigaet *al.*, 1994; Odima 1994; Peeler and Omore 1997; Gachuiriet *al.*, 1998; Bebeet *al.*, 2000; Owen *et al* 2005). Other contributing factors are inadequate and costly veterinary services and lack of supportive credit facilities (Owen *et al.*, 2005). However, medium and large scale dairy farmers in Kenya are able to access financial credits that facilitate implementation of modern animal husbandry practices(Wakhungu 2001). These farms therefore are better and more efficiently managed relative to the small holder farms (Odima 1994; Wakhungu 2001). Consequently, they have improved herd genetics with increased individual

and herd milk output (Ojango and Pollot, 2001). Although the Kenyan medium and large scale dairy farms contribute only 20% of the total marketed milk (Muriukiet *al.*, 2003), they play a key role in the country's dairy sector by providing high quality breeding and replacement dairy stock (Wakhungu , 2001). In addition, they raise 30% of their annual income from the sale of high quality dairy stock to local and export markets (Peeler and Omore, 1997; Ojango and Ollot 2001). The rest of income is raised from marketed milk (Muriukiet *al.*, 2003). These medium and large scale farms are also important as they actively lobby for interests of dairy industry and contribute to the dairy sector policy development milk (Muriukiet *al.*, 2003).

Justification

Agriculture is the mainstay of most economies in Africa. In Kenya, dairy is mostly practised in small holder households. However, most of these farmers still have not adopted the modern technologies of dairy production. This has led to milk productivity remaining low.

Main Objective

The overall objective of the study was to investigate the impact of traditional methods of dairy cattle production.

Specific objectives

- (i) Determine farming systems and breeds of dairy cattle.
- (ii) Determine the feeds used in farms
- (iii) Determine the source of dairy information for the farmer

Research questions

- (i) What type of animals are kept in study sites
- (ii) What are the production systems in the study site
- (iii) What management practices are adopted in the farms
- (iv) What is the effect of production system on milk production

2. LITERATURE REVIEW

Traditional is defined as typical way of doing things that people have been accustomed to (Macmillan dictionary). Traditional dairy production system would include the farms where minimal adoption of modern technologies. In peri-urban production systems herds are located within a 20660 km radius of major cities. The system is located near highly populated urban centres where the producers have easy access to consumers. This production system is market oriented where the producers have adequate resources and have access to credit to acquire inputs such as feed supplements, veterinary inputs and improved genotypes. (Brokken and SenaitSeyoum 1992).

The main features of peri-urban dairy systems:

- composed of smallholder dairy producers
- main sources of feed are crop residues, cultivated fodder and agro-industrial by-products
- milk is often sold directly to the consumers and is the main source of cash for smallholder farmers
- many smallholder producers use relatively intensive stall-feeding technology in zero- or semi-zero-grazing systems
- high grade dairy cattle are used
- farm-grown fodder and supplementation can be used by many farmers. (FAO Food and Agriculture Organization of the United Nations, 1998)

Dairy farmers in rural areas practice extensive production system. In the extensive system farmers own sizable pieces of land and practice integrated crop-livestock production. In this system, crop residues are utilised when feed is scarce but nutritional inadequacies remain. Transfer of technology is not easy and, in spite of this, a few farmers in this system have adopted improved technologies. Productivity nevertheless is below potential because animals are fed at below the optimum level. (Brokken and SenaitSeyoum 1992).

Challenges of dairy farming in Kenya

The dairy industry in Kenya is faced by various challenges. Constraints to increased milk production in Kenya have been identified as seasonality in production, inadequate quantity and quality of feed, including limited use of manufactured cattle feeds, and lack of good quality animal husbandry and farming practices. Poor access to breeding, animal health and credit services and high cost of artificial insemination service are other constraining factors. In some areas, dairy producers are faced with the problem of poor infrastructure (roads, electricity), inadequate milk collection and marketing system, poor interaction and priority setting between research, extension and training and limited farmers' involvement in the output market, hence reducing the incentives to increase milk production (SDP, 2005).

Inadequate nutrition is a major constraint to productivity of cattle in SSA. Nutrition stress can influence a cow in the following ways:

- cow fertility during the service period can be lowered by poor nutrition

- low energy content in the feed results in low live-weight gains and low milk yield in early lactation
- poor nutrition leads to delay in resumption of ovarian activity and a lowered conception rate.

3. RESEARCH METHODOLOGY

Study area

The study was carried out in Kibiyet region, Nandi (Rural County) and Ndumboini area, Kiambu (Peri-urban County). In the farms visited in each county, farming systems were similar with variations in the type of housing and herd size.

Data collection.

Data was collected through administering questionnaires in 40 selected farms. 25 farms in Kibiyet region, Nandi County and 15 farms in Ndumboini area, Kiambu County. The farms were selected randomly. Most of the respondents were animal handlers who managed the animals on daily basis. Field research was tailored to meet specific objectives of the study, in depth interviews to elicit responses from the respondents and observation to ascertain the validity of the response.

Secondary data

This was obtained through library research where books, newspapers, publications and various websites were searched to get the required information.

Data analysis and presentation

The data was collected and entered into MS Excel spreadsheets for ease of management. The MS Excel was also used to run the analysis of the data, to produce the necessary percentages with respect to responses.

4. RESULTS AND DISCUSSION

	KIAMBU COUNTY	NANDI COUNTY
Average no. of cows	3	6
Main method of breeding	A.I (99%)	Natural (80%)
Mean age at first breeding	18 Months	21 Months
Mean age of first calving	27 Months	30 Months
Culling method used	Slaughter (63%)	Sale (50%)
Basis of selection of the replacement stock	Sire performance (88%)	Growth rate (60%)
Method of controlling external parasites	Spraying (90%)	Dipping (95%)
Record keeping	Absent	Absent
Average milk production per lactation period	1215 litres	1525litres

Animal data

Average number of cows was 3 and 6 in Kiambu and Nandi counties respectively. Friesian was highly preferred breed due to its high productivity (Fig 1 and 2). Replacement stock was selected based on the sire performance and growth rate of the individual animal. Information on sire performance was provided to the farmer through interpretation of the catalogue by the inseminator.

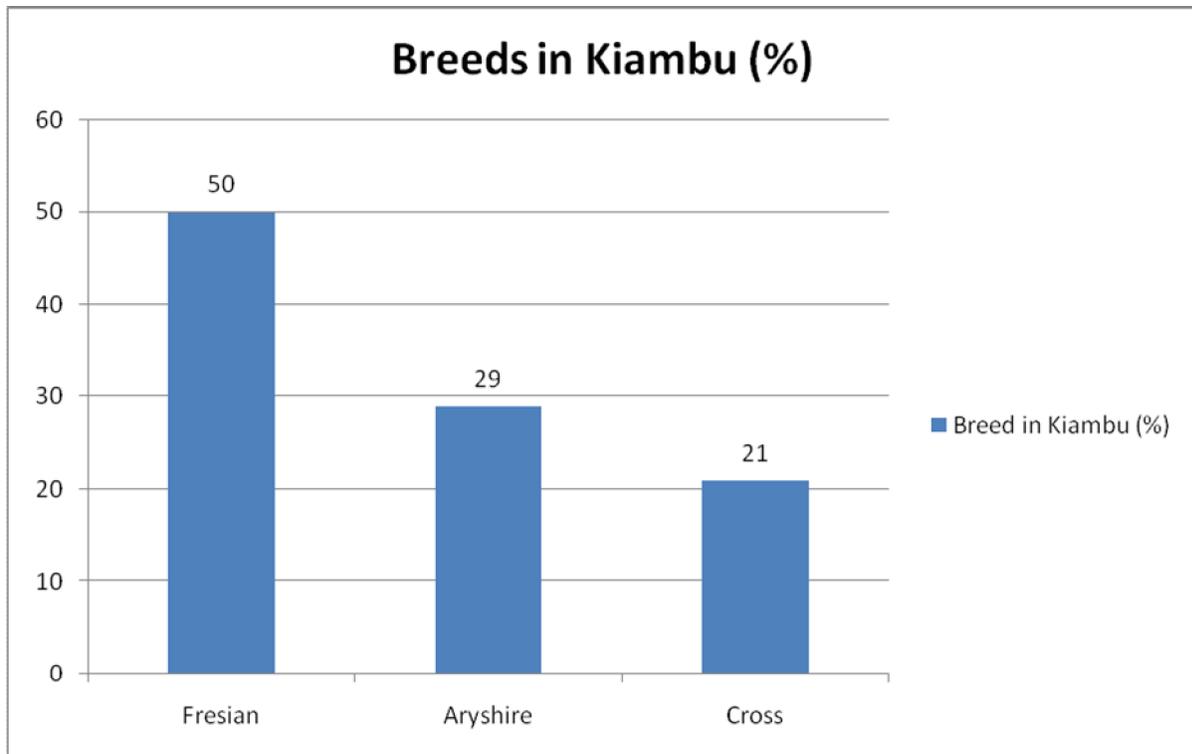


Figure 1 showing breed distribution in Kiambu county

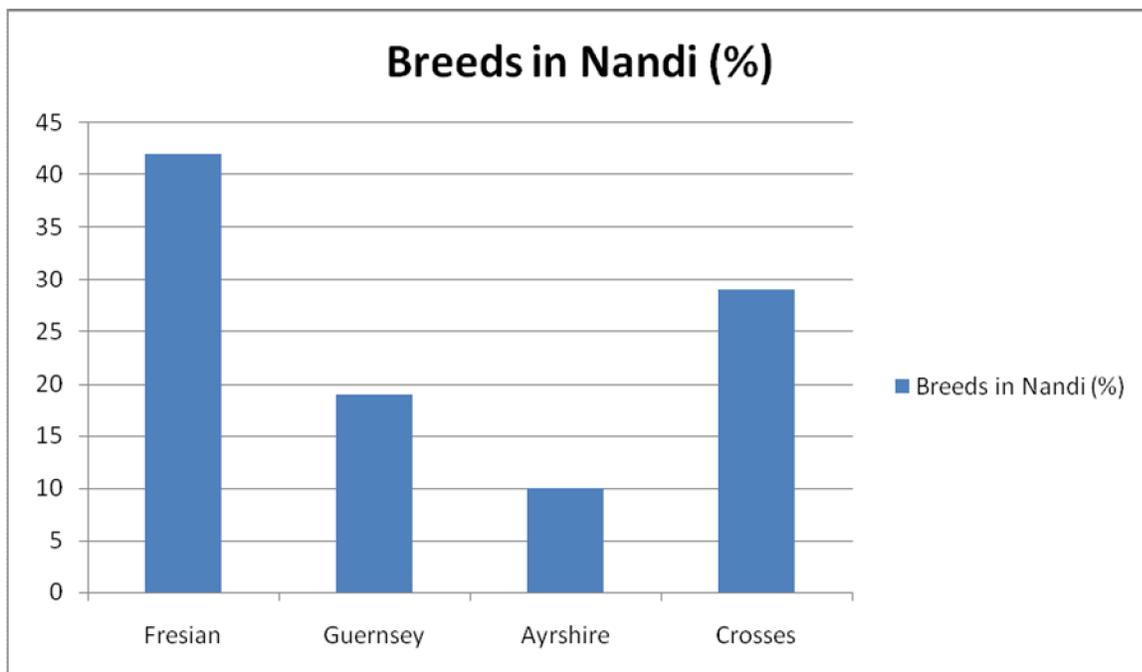


Figure 2 showing breed distribution in Nandi county

Feeding

In Nandi county, 90% of animal feed was from grazing in the fields. Types of grass available include oat, kikuyu grass, star grass, nut and Rhodes grass. 10% of the feed was through supplementation of milking cows with 2 kilograms of dairy meal daily mixed with a handful of mineral supplements. In Ndumboini area, 20% of feed was from concentrates from feed commercial firms and 80% from kikuyu grass, banana stalks, chopped napier grass harvested from fields and taken to dairy units.

Parasite control

Parasitism was a major problem in extensive farms where the animals were grazed and interacted with other animals. External parasites for example *Boophilus* and *Rhipicephalus* species could be seen on general examination during data collection. Consequently, these ticks are responsible for transmitting East Coast fever, Babesiosis and Anaplasmosis. Control measure was through weekly dipping. For the peri-urban farms, animals were sprayed weekly. In both systems, internal parasites were controlled through routine deworming at three months interval.

Disease management programmes

In both counties, Animal Health Assistants were consulted when animals fell sick as shown in Fig. 3. Professional advice from veterinarians was sought in complicated cases and notifiable diseases for example Foot Mouth Disease, Black quarter, Rabies and Rift Valley fever. Vaccinations were done only when government rolled out programmes and the target diseases reported include Foot and mouth disease, Contagious Bovine Pleuropneumonia and Lumpy skin disease. There was no herd health program in all the farms visited.

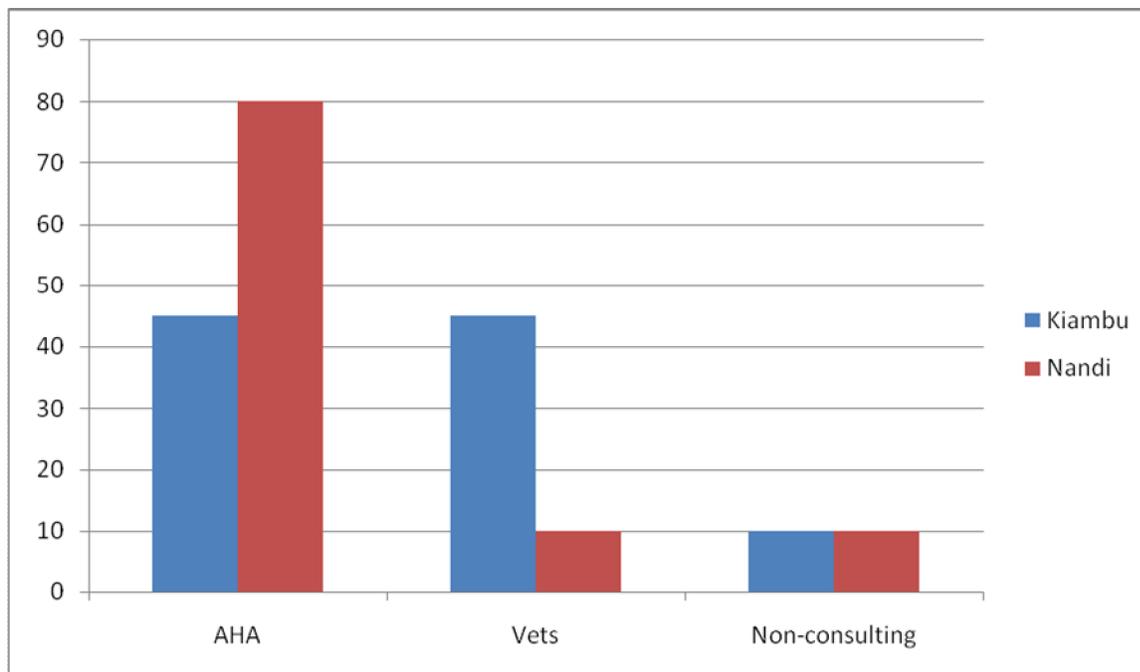


Figure 3. Preferred service provider for clinical cases

Breeding

Heifers are bred when they begun to show signs of estrus. In Nandi district, 80% of females are bred naturally while in Peri-urban they are artificially inseminated. This is due to the close proximity to Kenya Animal Genetic Research Centre and availability of Artificial insemination services. Estrus is detected by animal handlers who are proficient in observation for estrus signs. Signs that they look out for include females standing to be mounted, clear vaginal discharge and decreased milk production. Reproductive problems reported include abortion and repeat breeding.

Records.

99% of the farms visited do not keep production records. The only available records are receipts of milk sales and their interest was on the amount of money accrued rather than amount of milk produced. Farmers in Kabiyeet region, Nandi District selling their milk to cooling plants recorded an average of 1525 litres per lactation period. Farmers from Ndumboini had an average of 1215 litres per lactation period.

General comments

From the study, it was established that 95% of farmers in Nandi county ventured into dairy as a tradition rather than a business. On the other hand, the peri-urban farmers ventured so as to produce milk for sale to the urban population. Future ambitions in both settings were more milk through more cows rather than the ideal of decreasing the herd size and increasing productivity. Those that had encountered a lot of health problems were planning to switch to other business for example rental houses especially in Kiambu County.

5. CONCLUSION AND RECOMMENDATIONS

The following conclusions were drawn from peri-urban farms:

- Lack of production records in the farms makes it difficult to monitor production levels and identify shortfalls.
- Lack of herd health programmes has a negative impact since the farmer cannot establish goals of and identify ways to attain the set goals
- Mean age of first breeding is below the recommended which is 14 months

Conclusions drawn from extensive farms in Nandi County:

- Mean age of first breeding was high and this delays production
- Natural mating should be replaced with Artificial insemination to achieve the desired traits and limit inbreeding
- Farmers considered dairy as a tradition rather than a business enterprise. And for this reason they did not take time to evaluate the level of production and what can be done to improve.
- Animal health Assistants are widely consulted whereas veterinary surgeons are better placed to offer advice and services to the farmers.

To improve on milk productivity the following is recommended for both counties:

- Records should be kept since it gives a timely performance reports for production, reproduction and disease.
- Farmers should embrace Herd Health programs so as to come up with relative objectives and methods to be employed to achieve the targets of production.

- Mean age of first breeding can be improved to 14 through improved nutrition and careful monitoring of first heat of the heifers
- The farmers should actively seek new information on dairy farming through extension services and attending agricultural shows and adopt them for better production
- Farmers should focus on improving productivity of individual animals rather than increasing herd size.
- It is recommend that aspiring farmers should seek adequate information before venturing into dairy business so as to familiarize themselves with the dairy recommended parameters
- Farmers should consult veterinary surgeons more than Animal Health Assistants who are aware of new reproductive technologies.

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7. APPENDIX

Questionnaire

A. Animal data

No of animals in the farm _____

Breed of animals kept _____

Average age at first lactation _____

Method of selection of replacement stock _____

Method of culling _____

B. Feeding

What makes the bulk of animal feed _____

Source of feed and its availability _____

C. Parasite control

Is parasitism a major problem in the farm? _____

What parasites are encountered? _____

Frequency of deworming _____

Frequency of control of external parasites _____

Method of control of the external parasites mostly used. _____

D. Disease management programmes

Who does the farmer consult when animals are sick? _____

Are the animals vaccinated and if yes what are the target diseases. _____

Is there a herd health programme in place? _____

E. Breeding

What is the age at first breeding? _____

How do you breed the animals? Natural mating or artificially. Reason? _____

If AI where is the source of the semen? _____

How do you detect estrous? _____

Any reproductive problems reported in the farm? _____

F. Records

Are there records in place? _____

If yes what is the system used to record? _____

Are the records reviewed periodically? _____

Milking methods and milking data _____

What is the production level per lactation period? _____

What is the average lactation period? _____

G. General comments

What motivated you to begin the dairy farm? _____

Future ambitions of the farm? More milk or more cows? _____

Is the farm motivating or you plan to switch to something else? _____