DAIRY PRODUCTION AMONG SMALL AND MEDIUM SCALE FARMERS IN NIGERIA: A CASE STUDY OF KADUNA AND KANO STATES

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Abstract
A study of dairy production and processing by small and medium scale farmers was conducted in Kaduna and Kano States of Nigeria. The survey showed that dairy production is characterized by low milk production, and poor milk hygiene as a result of the use of indigenous/local breeds of dairy cattle managed under pastoral production system by Fulani herders which dominate the dairy sub-sector. There are limited availability of dairy production and processing technologies and facilities in these target states. Dairy processing and marketing are not well developed with hand milking and marketing by Fulani women being a common feature. These local women process these products into 'nono' (fermented milk) and yoghurt and market these milk products in semi-urban and urban cities and in the communities. Identified key constraints to small and medium scale dairy farming are lack of suitable improved breeds of dairy cattle, lack of modern dairy technologies and facilities, and dearth of such modern dairy technologies and facilities, and dearth of such

infrastructure as electricity and access road network. Other constraints include the poor socio-economic status of dairy farmers, poor input supply and distribution system, lack of credit facilities and insufficient institutional support. In order to promote the development and commercialization of the dairy sub-sector, it is recommended that there should be sustained provision of dairy technologies, technical and business advisory services to dairy farmers, modern market development and facilitation and capacity build/training of dairy producers and processors. There is the need for institutional and infrastructural support and development of a strong public-private partnership (PPP) for enhanced business environment and private sector participation.

Introduction

Over 2% of world milk is produced in Africa. The principal exporters of milk products are the European Community (EC), New Zealand and the USA, with the EC typically accounting for up to half of the total (Nell, 1990).

Dairying is a biologically efficient system which converts large quantities of medible roughage to milk. Milk production is more efficient than beef production when the nutritional potential of the feed resource base is high and therefore capable of supporting high levels of production. It is a continuous production process and requires a continuous supply of feed of consistently good quality. Beef production, on the other hand, is often better adapted to the seasonal fluctuations that are so common in sub-Saharan Africa (Nell, 1990).

Dairy production in sub-Saharan Africa is restricted to five agro-ecological zones, namely, Arid, semi-arid, sub-humid, humid and highlands (Jahnke, 1982). The five milk production systems recognized in sub-Saharan Africa are pastoralism, mixed farming, intensive dairy farming and peri-urban dairying.

Milk production in sub-Saharan Africa has more than doubled over the past 30 years, with most of the growth occurring since the mid-1970s. Gains in production have been largely affected by population increases. However, the encouraging trend is that the annual percentage gains in cow milk production since the late 1970s

have exceeded population growth [Shapiro, *et al*, 1990]. In terms of demand for dairy products in SSA, the World Bank (1990), noted that consumption stands at 27kg LME per caput, growth rate in total demand 4% per year and income elasticity of demand 0.8%.

Sub-Saharan Africa augments its milk production with dairy products imported either commercially or as food aid donations. Imported products include dry milk powder (whole and skin), butter and butter oil with dry milk powder dominating. On a liquid-milk-equivalent (LME) basis, dry milk and butter/butter oil account for about 80% of total dairy imports (Shapiro, *et al*, 1990).

With respect to Nigeria, Nwoko (1986), listed only 13 dairy plants in Nigeria, most of them in the north, with capacities ranging from 500 to 35,000 litres a day and operating at 10% to 100% of that capacity. The village based traditional dairy processing and marketing system is also an important feature in Nigeria with such milk products as 'nono' and 'fura' which are marketed in small towns and large cities, like Zaria (Simmons, 1973; Waters-Bayer, 1988). According to a 1981 World Bank estimate, only 3% of Nigeria's national herd was exotic. Most milk is from Fulani-herd cattle. (Waters-Bayer (1988), estimates that about 350,000 tonnes of milk from traditionally managed herds are processed by traditional methods and sold annually, compared with an estimate by Nwoko (1986), of 221,200 tonnes for 1983. While this latter figure was dwarfed by imports of almost 800,000 tonnes in 1983 (Nwoko, 1986), traditional production, processing and marketing are nonetheless important.

According to Nell (1990), the potential for commercialization of milk production depends to a large extent, on the production system. The potential to increase milk output from pastoralists and agropastoralist production systems is limited and depends on costs of collection, transport and processing. Mixed farmers and intensive dairy farmers in rural and peri-urban areas have more control over their inputs and improvements in inputs result in increased milk output. There is thus the potential to increase milk production per cow, per farm and per unit area, which would reduce the cost per litre of the required supporting infrastructure (input supply, animal health services and marketing).

This study, therefore, examines the potential for commercial dairy production among small and medium scale farmers in Nigeria with empirical evidence from Kaduna and Kano States.

Research Methodology

The Study Areas

The study locations were Kaduna and Kano states which are prominent in dairy production in Nigeria.

Kaduna State

Kaduna State occupies almost the entire mid-central portion of the northern parts of Nigeria and shares common borders with Zamfara, Katsina, Niger, Kano, Bauchi and Nasarawa States and the Federal Capital Territory (FCT). The State is located between latitudes 9^0 03´N and 11^0 32´ north of the equator and longitudes 6^0 05´ and 8^0 30´ east of the Greenwich Meridian.

The State experiences a typical tropical continental climate with two district seasons, the dry and rainy seasons. The average annual rainfall is 1,272.5mm; average humidity, 56.64%; wind speed, 176.12 knots; average daily minimum temperature, 15^01^0C and average daily maximum temperature, 35.18^0C.

Kaduna State's topography is favourable for small, medium and large-scale farming and for tourism (Kaduna State Economic Empowerment Development Strategies, KADSEEDS, 2005). Based on the 2006 census, the State has a population of 6.1 million (National Population Commission, NPC, 2006) distributed in 23 LGAs.

Agriculture is the mainstay of Kaduna State's economy. It is estimated that 80% of the population are engaged in small and medium – scale farming. Predominant feed crops grown in the State are maize, rice, cassava, sorghum, millet, yam, cocoyam, beans and irish potatoes. Major cash crops include sugar cane, ginger, tomatoes, pepper, groundnut, rice, irish potatoes, soya beans and cotton.

The State is endowed with a number of livestock breeds, such as cattle (Bunaji), goats (Sokoto Red, West African Dwarf), sheep (Yankari, Balami, Uda), pigs (Yorkshire, Hampshire), poultry (layers,

broilers, ducks, turkeys, etc.), rabbits, fish and bee-hives (National Livestock Survey, 1990).

Of the 14 million heads of cattle in Nigeria, Kaduna State accounts for 7%. The decline in dairy development over the years could be attributed to such factors as faulty design approach, unstable government policies, non-involvement of the private sector, and non-inclusion of livestock farmers from the on-set (Kaduna State Government, KADSG, 2005). The dairy sub-sector is also under-developed resulting in low milk production, poor milk hygiene and prevalence of diseases. It is also affected by lack of processing facilities, equipment and supplies.

Kano State

The total land area of Kano State is 20,760sq km with 1,754,200ha of agricultural and 75,000 ha of forest vegetation and grazing land. It is bordered on the east by Adamawa State, to the south by Bauchi and Kaduna States, to the west is Katsina state while to the north are Katsina and Jigawa states.

The temperature of the State usually ranges between a maximum of 33^0C and a minimum of 15.8^0C. The average rainfall is between 63.3mm and 48.2mm in May and 133.4mm and 59mm in August, the wettest month (Kano State Government, KSG, 2005). The rainfall pattern is unimodal with an average rainfall of 600mm (Kano State Economic Empowerment and Development Strategy, KSEEDS, 2005).

Kano State is made up of 44 LGAs with a population of 9.4 million (National Population Commission, NPC, 2006) with an almost equal distribution of males (51%) and females (49%) (KSEEDS, 2005).

Agriculture is the mainstay of the state's economy involving at least 75% of the rural population. Rain fed and small scale irrigated agriculture are practiced in the State at small and medium scale levels. Crops grown include cotton, guinea corn, groundnuts, maize, cowpeas and varieties of vegetables. The State has an estimated 1,754,200 ha of cultivated land area and 75,000 ha of forest vegetation.

Major livestock produced in the state include cattle (while Fulani, Bunaji and Rahaji Breeds), sheep, goats and poultry (KSEEDS, 2005) The estimated total livestock population is 9.2 million with an output of 2,36,102 mt of meat, 87 million litres of milk and about 49 million eggs per annum.

The farming system is characterized by mixed cropping and mixed farming and sedentary pastoralism/trans-humans. About 62 different cropping patterns or mixtures feature in the mixed cropping system. The percentage of households growing different crops are as follows: 61.8% for sorghum, 44.2% millet, 52.7% maize, 16.4% rice and 27.3% groundnut (Kano Agricultural Programme, KADP, 2007). Mixed farming is the dominant system of agricultural production with crop production combined with rearing of livestock and poultry.

The livestock sub-sector is under-developed. It is characterized by low milk output of local breeds, and poor milk hygiene, among others. Further, dairy production is adversely affected by lack of equipment, inadequate facilities, limited skilled personnel and inadequate infrastructure such as rural access roads, buildings and irregular electric power supply.

Private sector participation in livestock production on commercial basis is gradually picking up in the state. This is seen in the form of setting up small-holder dairy farms consisting of upgraded cows using Friesian and/or Simmental bulls. It is observed that milk yield from upgraded cow per day averaged 8 litres per head per day. This is 800% higher than the production from the traditional cow. Thus a wide difference in output indicates high potential in commercialization of small-holder dairy production system in Kano State (Kano Agricultural and Rural Development Authority, KNARDA, 2007).

Sampling Procedure

Three stage sampling method were used in the selection of respondents for the study. The first stage concerned the random sampling of five (5) representative urban and rural LGAs respectively. The second stage involved the purposive sampling of ten (10) small and medium-scale dairy farms respectively for the study. The third and final stage focused

on the identification of about 3 key officers managing the farms for in-depth interview and/or group discussion. In total, about 60 farmer respondents were involved in the study.

Methods of Data Collection

Primary data were generated through consultation meetings, focus group discussions (FGDs) and in-depth interviews. Meetings and discussions were organized with various stakeholders and target groups involved in dairy production in Kaduna and Kano States. Indepth interviews were targeted on key informants. Guided discussions and in-depth interviews were organized to elicit relevant data in line with the objectives of the study.

Secondary data were collected from journals, technical reports from the Kaduna and Kano State Agricultural Development Programmes, ADPs, and other relevant publications.

Data Analysis

Primary and secondary data were collated and screened for analysis with the aid of a computer programme, the Statistical Package for the Social Sciences (SPSS).

Descriptive statistics such as mean, frequencies, tables and cross-tabulations were used to characterize and analyse the data generated from the study.

Results and Discussion

Kaduna State

Characteristics of Small and Medium Scale Dairy Production

The estimated number of cattle in Kaduna is 2,041,049, while the number of cows-in-milk is 771,516. Total milk production per annum is 416.7 million litres with a yield figure of 1.5 litres per day. The estimated net income per animal per day is about 250 Naira.

Dairy production by farmers in Kaduna State is characterized by low milk production and poor milk hygiene. Low milk yield or production could be attributed to the use of indigenous breeds of cattle. The predominantly local breeds such as Bunaji (white Fulani) and some Rahaji and Sokoto Gudali managed by pastoralists have poor

genetic quality for milk production. High-producing exotic breeds are few and are found mainly on commercial private farms under intensive management.

Dairy Production Systems

Kaduna State has an agroecological climate with semi-arid, sub-humid, plateau and well drained soil that favour dairy production. The socio-cultural background of the population has high demand for milk and milk products. The following dairy production systems are prominent among small and medium scale dairy farmer in Kaduna State: pastoralism, agropastoralists and intensive dairy farming. With pastoralism, the pastoralists move around with their herds in search of fresh pasture lands or grazing areas. Agro-pastoralism is practiced by sedentary farmers who grow food crops and also keep livestock. In intensive dairy farming, farmers use part or all of their land to grow fodder crops for their dairy cattle. This system of dairy production is mainly undertaken by small farmers using family labour while commercial farms use hired labour.

Dairy Processing and Marketing

Available milk processing technologies were identified to include hand milking and churning by local milk maids, milk fermentation to produce local yoghurt, semi-mechanical yoghurt making and mechanized milk processing. Hand milking and churning is common practice among pastoralists or traditional small scale and medium scale dairy producers in Kaduna State. Their major processed products are yoghurt, 'nono' fermented milk. Semi-mechanised and mechanized dairy processing feature mainly in commercial medium and large-scale dairy farms in the state.

Some of the dairy processing plants in the state include NIYYA Your Farms, Kaduna; Home Fresh Yoghurt, Kaduna; FAN Milk Yoghurt, Zaria; NAPRI Yoghurt, Shika-Zaria and Milcopal-farms, among others. They use mechanical methods in processing milk into yoghurt and other milk products in the State.

There are about eleven (11) dairy processing plants in Kaduna State. Many of these dairy firms engage in both commercial production

and processing of milk into varieties of marketable products. These may be fresh milk or processed milk products, such as yoghurt and 'nono' fermented milk, which are sold or marketed by Fulani women in the communities, as well as in semi-urban and urban cities of Kaduna, Zaria, Birni Gwari, Kafanchan, Zonkwa, etc. The Kaduna Federation of Milk Producers Cooperative Association Ltd (KFMPCAL) is an umbrella organization for about forty (40) village milk associations that are engaged in milk production, processing and marketing in Kaduna State.

Constraints of Small and Medium Scale Dairy Farming

Identified constraints to dairy production in Kaduna State were unavailability of improved breeds of dairy cattle, high cost of using exotic or improved breeds, unhygienic milking processes and inadequate health care provision and facilities. Poor genetic quality of local breeds of dairy cattle limit their milk yield to a low uneconomic level when compared to the exotic breeds of Friesian Holstein and New Jessy. High cost of using these exotic or improved breeds of dairy cattle and associated high technology such as artificial insemination for producing cross-breeds constitute a major problem. Other related costs such as transportation and management costs are critical factors that limit enhanced commercial milk production and processing among small and medium scale dairy producers and processors in the state. Unhygienic milking/processing due to lack of or unavailability of milking parlours and equipment lowers the demand for milk and milk products from small and medium scale dairy producers and processors in the state.

There are limited institutional capacities in dairy farming with respect to the use of artificial insemination related equipment in Kaduna State. Most of the breeds are local, and available exotic bulls on some farms are imported for the purpose of cross-breeding to upgrade the local breeds for higher milk production. Generally semen equipment, exotic bulls and standard milking machines are imported from Holland, India and China.

Kano State

Characteristics of Small and Medium Scale Dairy Production

The estimated dairy cattle population in Kano State is 900,000. Specifically, the estimated total milk production in the state is 810,000 litres. Thus milk yield per animal is about 2 litres. In terms of returns or income, the estimated net farm income per animal per day is 100–150 Naira.

Two prominent breeds of cattle (Bunaji/White Fulani and Rahaji) are found in the State. The productivity of these breeds of dairy cattle are threatened by insufficient feed with the right quality [KNARDA, 2007]. Dairy production practices are predominantly traditional with low milk yields and slow growth rates.

Dairy Production Systems

There are five types of dairy production systems that are recognized in sub-Saharan Africa. These are pastoralism (nomadic and transhuman), agro-pastoralism, mixed farming, intensive dairy farming and peri-urban dairying. However, the commonly practised dairy production system in Kano State is pastoralism. Under this traditional system, the pastoralists are with the herds always and move continually looking for fresh grazing areas. It is characterized by subsistence, milk production, communal grazing, low milk output and limited potential for commercialization. Although the other dairy production systems exist in Kano State, intensive dairy farming and peri-urban milk production have good potential for commercialization than the pastoral system. These are mainly practiced by medium and large scale dairy farmers in Kano State.

Dairy Processing and Marketing

There are varied numbers of available milk production technologies in the State including local milk processing technology for fresh milk and yoghurt production. Hand milking and churning constitute a common practice among Fulani women who process fresh milk into ‘nono’ (fermented milk) and yoghurt. They market these milk products in semi-urban and urban areas of Kano State. A few privately owned milk processing facilities exist with an estimated capacity utilization in processing activities of about 25-30%.

Constraints of Small and Medium Scale Dairy Farming

There are many constraints that bedevil dairy production in the State. The most critical problems identified were lack of suitable improved breeds of dairy cattle, lack of modern dairy facilities and lack of infrastructure (e.g. electricity, access farm road network, etc.). Others include poor socio-economic status of dairy farmers, poor input supply and distribution system, insufficient institutional support and lack of credit facilities to dairy farmers, among others. Local breeds of dairy cattle have limited potential for optimal milk production. Only few farmers have exotic bulls for cross breeding purposes. It is important to note that there is little or no rural roads constructed or electricity linked to dairy producers and processors in Kano State. These identified constraints hamper the commercialization of small and medium scale production and processing in the State.

Conclusion and Recommendations

Kaduna and Kano States of Nigeria have the potential for the development and commercialization of the dairy industry in Nigeria. This is against the background of the climate and agro-ecological conditions as well as the socio-cultural and occupational background/characteristics of the population. However, the identified constraints above need to be addressed for the realization of these potentials. Thus, the following recommendations are proffered for action:

1. ***Provision of appropriate dairy technologies and advisory services***

   Advisory services and dairy technologies such as exotic bulls for cross breeding, milking parlour and milking machines, etc., should be made available to dairy farmers in the State. The States Agricultural Development Programmes (ADPs), NAPRI, FAN Milk and other service providers should be funded to educate and provide technical support to dairy producers and processors on improved animal production and health technologies, milk hygiene and milk handling, transportation and marketing.

2. ***Provision of technical and business advisory services***

This could be in terms of construction of standard cattle pens, milk collection and preservation, milk transportation and marketing, etc. Other areas of intervention for dairy producers are with respect to improved breeds, pasture management, collection centres etc and in the case of dairy processing, provision of chilling machines, preservers, boilers, centrifuges, packaging and cold storage facilities.

Marketing agents and consumers should be targeted with business advisory services on linkage with processors, product management for quality standard, product knowledge, storage and handling.

3. ***Market Development and Facilitation***

Dairy marketing in Kaduna and Kano States is not well developed because of weak linkages between producers, processors and marketers. Modern infrastructure, such as cold vans, storage facilities and collection centres are not adequately in place.

Thus, the type of market facilitation required include the establishment of collection centres at strategic locations in the dairy value chain clusters. These collection centres should have grading, quality control and packaging facilities. Dairy farmers should be encouraged to be members of dairy farmers associations to promote cooperation and resource procurement and distribution among themselves in Kaduna and Kano States.

4. ***Capacity Building/Training***

Small and medium scale dairy producers and processors in these large states are grossly lacking in modern production and processing techniques or methods. Thus there is the need to equip them with the knowledge and skills with respect to best practices in dairy production and management, processing, storage/preservation and marketing. They also need support in the area of group dynamics, organizational management, financial management, accounting and farm record keeping.

5. ***Institutional and Infrastructural Support***

There is the need to strengthen the linkages between available relevant institutions in Kaduna and Kano States with small and medium scale producers, processors and marketers. These institutions include commercial banks, communication media (e.g. radio and television), Power Holding Corporation of Nigeria (PHCN), Dairy and development partners, such as the world Bank and FAO, etc. There is an opportunity for synergy between these institutions and dairy farmers/processors for technical and funding assistance. This will be feasible with the development of a functional public-private sector partnership (PPP) arrangement between the government and the private sector. There is the need to promote business environment for the commercialization of small and medium scale dairy farming through adequate provision of such infrastructure as electricity (power supply), access roads and water supply and transportation facilities.

With the implementation of the above recommendations, it is expected that the dairy sub-sector will be developed and commercialized; thereby contributing significantly to the non-oil sector Gross Domestic Product (GDP) in Nigeria.

References

Jahnke, H. E.(1982), *Livestock Production Systems and Livestock Development in Tropical Africa,* Kiel, Germany: Kieler Wissenschafts verlag Vauk, 273 pp.

KADSEEDS (2005), cited in Kaduna State Plan of Action (2004 – 2007), Kaduna State Ministry of Economic Planning.

Kaduna State Government, KADSG, 2005), *Kaduna State Framework for Dairy and Fruit Juice Development*, Kaduna: KADSG, May 2005.

Kano State Agriculture Development Project, KADP, (2007), *National Programme for Food Security (NPFS): Baseline Survey Report for Six Additional Sites for the Expansion Phase*, Kaduna: KADSG.

KNARDA (2007), "Commercial Agriculture Investment Support" (Unpublished material prepared for the Commercial Agriculture Development Project (CADP).

K-SEEDS (2005), Kano State Economic Empowerment and Development Strategy. Policy Framework & Project Summary 2005.

National Livestock Survey (NLS) (1990), in Kaduna State Economic Empowerment and Development Strategy (KAD-SEEDS).

National Population Commission NPC (2006), Provisional Population Census Figures.

Nell, A. J. (1990), "An Overview of Dairying in sub-Saharan Africa: Dairy Marketing in Sub-Saharan Africa," Proceedings of a Symposium held at ILCA, Addis Ababa, Ethiopia, 26 – 30 November, 1990 ed. Ray F. Brokken and Senait Seyoum.

Nwoko, S. G. (1986). The development of dairy imports in Nigeria. LPU Working Paper 10 LPU (Livestock Policy Unit), ILCA (International Livestock Centre for Africa), Addis Ababa, Ethiopia. 70 pp.

Shapiro K, Jesse E. and Foltz J. (1990), Dairy marketing and development in Africa. Proceedings of a Symposium held at ILCA, Addis Ababa, Ethiopia 26-30 November, 1990 ed. Ray F. Brokkey and Senait Seyoum.

Simmons, E. B. (1973), The economics of consumer-oriented food processing technology in northern Nigeria. Samaru Agricultural Newsletter 15 (2), 56 – 72, Zaria, Nigeria.

Waters-Bayer A. (1988), Dairying by settled Fulani Agropastoralists in central Nigeria. The role of women and implications for dairy development. Farming Systems and Resource Economics in the Tropics 4. Kieler Wissenschaft sverlag Vauk, Kiel, Germany, 328 pp.

World Bank (1990), Dairy development in sub-Saharan Africa: A study of issues and options. World Bank, Washington, DC, USA.