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PrOpCom

Making Nigerian Agricultural Markets Work for the Poor

Monograph Series # 3

Using Livestock and Associated Product Markets to Demonstrate M4P In Nigeria

By

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**Using Livestock and Associated Product Markets
to Demonstrate MMW4P in Nigeria
May 2005**

*“In terms of the magnitude of poverty and the importance of livestock to poor households in the developing world, (our) analysis suggests that there are at least 550 million globally”
ILRI, 2003*

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CHEMONICS INTERNATIONAL INC.



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I. EXECUTIVE SUMMARY

A successful strategy for agricultural development will have to address the needs of both farmers and agro-based enterprises. In fact, the ability of emerging businesses in rural areas and rural-urban growth centers to increase the demand for off-farm employment and induce growth in rural wages, concurrently with increases in income brought about by growth in the volume and value of goods produced and marketed, are the major forces that will lead to sustainable poverty reduction.

The weak, complex and fragmented nature of commercial linkages in livestock-product value chains, especially with agro-industries, offer PrOpCom an opportunity to lay the ground work for demonstrating that systemic change in these value chains can provide a sound basis for pro-poor growth through enterprise development. By adopting an incentive system based on product quality assurance (application of norms and standards in product markets), interventions proposed in this document are expected to strengthen and improve the presently fragmented and inefficient linkages between livestock production and the agro-industry sector for both industrial end-users in the red meat value chain and rural enterprises in the commercial animal feed value chain.

The general outcome from improving these systemic weaknesses and inefficiencies is expected to be strengthened commercial linkages, eventually leading to: (1) an improvement in the supply-demand response resulting from more secure and efficient raw material supply chains for both industrial end-users and animal feed millers; (2) new and diverse commercial linkages enabling rural agribusinesses to increase capacity to expand and develop their product markets; (3) more efficient producer supply, enabling producers to diversify their market opportunities and to improve on-farm output in response to value added market incentives; (4) the development of commercial alliances among businesses (both vertical and horizontal integration) to improve the scope and efficiency of providing services to the rural sector and increase product value; and (5) the creation of new and diverse on- and off-farm employment opportunities for an un-skilled and semi-skilled rural and peri-urban labor force.

II. INTRODUCTION

The traditional view of agricultural development is generally based on the principle of increasing the productivity of staple food crops to ensure food security. However, agricultural development can also be viewed as creating and/or strengthening commercial linkages and alliances between and among actors in product value chains. Such linkages help to ensure the sustainability of improvements in productivity by strengthening market linkages through the development and creation of rural enterprises, key assets in promoting economic growth and reducing poverty in rural areas.

Enterprise development is a major driver of economic development that facilitates developing commercial linkages between smallholder farmers and rapidly growing urban markets. Rural enterprises also absorb an increasing share of rural employment and capture an increasing share of value added. Consequently, they can contribute to the rapid transformation of the rural economy from one dominated by production to one dominated by valued added services and off-farm employment. By so doing they contribute towards reducing rural-urban migration. Emerging businesses in rural areas and rural-urban growth centers can reduce poverty by creating demand for off-farm employment and stimulating growth in rural wages.

The key to improving commercial linkages through the value chain approach is through network development, creating multiple linkages or partnerships for all targeted stakeholders so that each can benefit from improvements in the value chain. The challenge is to move to a situation where there are strong, multiple linkages for all stakeholders. This is especially important in many developing country situations where market linkages between farmers and retailers/processors are fragmented and complex.

Such systems generally consist of many intermediary steps and stages, all having significant consequences for final product quality and overall efficiency of the marketing system, and improving efficiencies often require a re-organization of the multitude of middlemen to improve the marketing system. Inefficiencies frequently persist in such cases due to a lack of linkages between non-adjacent levels in the chain, a factor that tends to perpetuate the situation and must be overcome in order to improve value chain management and competitiveness.

Within this development context, the livestock and livestock-product market interventions discussed in this document will enable PrOpCom to lay the ground work for demonstrating that systemic change in these markets can provide a sound basis for pro-poor growth through enterprise development at all levels within and across strategic livestock-product value chains. The overall strategy consists of: 1) increasing agricultural productivity in response to specific market demand that reduces speculation in key product markets and stabilizes producer incomes through improved commercialization of higher-valued products, 2) improving the business environment for formal large, agro-businesses so that over time they invest, create jobs (particularly peri-urban), and develop faster and, 3) improving the efficiency of informal MSMEs so that the sector can increase value addition and job creation, thereby providing better opportunities for agricultural output to find attractive new markets. In the following pages, opportunities within livestock and livestock-product markets and associated feed and feed raw material markets sectors will be discussed within the context of making markets work better for the poor.

III. BACKGROUND

For pro-poor growth to occur, what matters is not the rate of growth of agriculture but the rate of growth of agricultural productivity. What is desired are productivity increases that lead to increased revenue and disposable incomes for both rural and urban poor. In addition, productivity increases that encourage industrial growth and the expansion of off-farm employment opportunities through more efficient and competitive raw material supply chains, will enable industry to respond to a more segmented, higher value product consumer market. However, in Nigeria the linkages between agriculture and industry are very weak, limiting their contribution to pro-poor growth.

Neither the agro-industrial nor its associated industrial and service sectors provide a significant outlet for Nigeria's agriculture's output to either help stabilize agricultural markets or to open up attractive new markets for crops. (For many of the major crops, industrial use accounts for less than 10% of total production¹.) This low level of commercial integration is due to a number of factors including a high rural and urban population that favor household processed food, the high cost of agricultural raw

¹ Sinha, Sunil, 2005. Analysis of the Linkages between Agriculture and Industry in Nigeria Contract. Number: CNTR 04 5838. Department for International Development, March 2005.

materials for industry, and a poor business environment that promotes an un-competitive formal and an inefficient informal agro-industrial sector. In fact the capricious interventions of government in agricultural and associated commercial sectors undermine the creation of a climate favorable to promoting private sector development and private investment.

More efficient agricultural-industrial linkages, leading to improved product competitiveness, have the potential to help farmers earn higher incomes for their crops by opening up new markets and absorbing additional output so that price volatility is reduced. Improving the efficiency and quality of raw material or on-farm or semi-processed product supply chains provides industry with an entry point to develop and penetrate new markets or increase present market share with higher valued, more competitively priced products. Increasing profitability is a major incentive for industry to promote and maintain quality standards, presently the major force driving value-added improvements in agricultural product supply chains.

Agriculture-industry linkages are fundamental in providing opportunities for the poor to improve their livelihoods. This relationship is based on the premise that pro-poor growth requires both an increase in on-farm incomes as well as opportunities to earn attractive non-farm incomes, thus helping the poor to diversify and improve their livelihoods, and agro-industry is a key sector for achieving such diversification². Moreover, unless new, adequately paid jobs are created, the high production costs and increasing retail prices for agricultural produce caused by current policies and institutions may limit the growth of consumption, the major factor increasing demand.

In 2003, DFID designed PrOpCom, a project dedicated to improving livelihoods through a private sector development approach based on making markets work better for the poor (MMW4P). PrOpCom is premised on the understanding that in Nigeria, markets may not work for the poor, but the traditional government response of state intervention in the market is also not likely to bring about sustainable, systemic change. Within this framework, what follows in this document is discussion of how the livestock and livestock-product and associated animal feed production and finished product value chains can be strategically strengthened and improved to demonstrate the innovative concept of MMW4P.

IV. INTERVENTIONS

A. Selection Criteria

There are three priority areas that need to be considered when selecting value chains that offer the potential to bridge the competitiveness gap and make a difference to the livelihoods of the poor, especially women.

The *first* is to ensure that farmers benefit from the growth of demand for agricultural produce (strengthen market pull for an increased volume and quality of produce), and reduce market entry barriers (improve competition) to reduce speculation that forces consumers to pay scarcity premiums. Doing so will require a combination of interventions that will result in providing better information to farmers, strengthening

² Refer to Discussion Document No., 7. Agricultural Commercialization, Value Chains and Poverty Reduction, Asian Development Bank, January 2005.

supply chain linkages through contract farming arrangements, expanding and developing linkages between merchants and farmers, addressing bottlenecks in intermediate processing in the informal sector markets, and improving access to finance for medium to large agro-processors.

The *second* is to increase agricultural productivity by the strengthening input linkages and the development of embedded extension services within the private sector. The incentive for developing such services is firmly rooted in classic BDS and based on developing commercial product markets for input and service providers. When service and input providers offer end-users advice on product-related management and technical issues, they can more effectively use such products. When such efforts are designed as an integral part of a business's commercial strategy, client contact and information can assist enterprises to increase existing market share, develop new products and penetrate new markets and diversify clientele.

Such an approach also facilitates the creation of linkages between enterprises providing complimentary services (seeds, fertilizer, agro-chemicals, extension knowledge) that can eventually lead to the development of more integrated and efficient input supply chains for producers. In addition, the development of distribution networks and strengthening the capacity of distributors/retailers through the technical and management training, can overcome many of the constraints farmers face related to input accessibility and their non-efficient, on-farm use. Finally, increases in agricultural productivity will accelerate the development of off-farm labor opportunities, provided that the linkages between agriculture and industry function efficiently.

The *third* is to promote competitiveness and quality assurance (verifiable certification) as core objectives in value chain improvements. Sustainability of product value chains can only be achieved if they have built-in incentives to make them increasingly more competitive and more quality conscience. Building value chain capacity for products destined for local markets can be the first step in deepening markets and developing the capacity necessary to penetrate more sophisticated and quality-demanding export markets. Developing value chains targeting domestic markets that are managed according to an incentive system that promotes smallholders productivity and the creation of un-skilled and semi-skilled jobs is a critical step towards promoting pro-poor participation in the development of future, higher-valued markets.

As value chains target increasingly more sophisticated export product markets, success becomes increasingly more dependent on specialized service providers and on developing strategic commercial alliances that will ensure competitiveness, both significant entry barriers for new players. This global requirement for specialization (for example **EUREPGAP**) is one reason why the development of global markets has marginalized the poor, whether they are smallholders or members of un-skilled/semi-skilled labor markets. In fact, when multiple standards have to be adopted at the farm level, the necessary changes in production and post-production activities required for modern agrifood systems become more difficult to implement and manage when large numbers of smallholder farmers are involved, making linkage consolidation (clustering) an inevitable consequence. Beginning to build capacity and structuring production within the context of value chains targeting local markets has the potential of increasing the chances for poor people to maintain some "piece of the action" in the future and mitigating some of the anti-poor impacts of globalization.

B. Livestock and Livestock-Product Value chains

Nigerian agriculture is dominated by the crop sector (83% of agricultural GDP), followed by *livestock* (10%), fisheries (5%) and forestry (2%). From 1999-2003, the annual growth in agricultural output agricultural output 3.8%, led by the crop sector at 4.4%, livestock at 4%, fisheries at 3.3%, and forestry 1.5%. In the livestock sector, poultry and goat meat recorded strong growth, while cattle meat recorded only moderate gains. However, only the lack of growth in the dairy sector prevented overall growth in the livestock sector to exceed that of the cropping sector.

The last detailed livestock survey was completed in 1992³. In monetary terms, the value of Nigerian livestock resources, based on prevailing market prices in mid-1991, was conservatively estimated to be in the order of US\$6 billion. Production characteristics for major species, numbers and geographical concentrations can be found in Annex II.

The sector is informal and operates within a framework of highly fragmented commercial linkages among the different players. Slaughter and butchering are basically confined to informal MSMEs. The large state owned slaughterhouses operate at very low capacity, except in the case of large poultry farms that process meat on an industrial-scale for the fast food industry. However, most poultry is maintained under traditional, low input, free-range systems of management, and commercial operations, particularly in southern States, only account for some 10 million birds, or 11% of the total estimated population of 82.4 million. Within this sub-sector the main industrial linkages are to the feed industry and industrial end-users (processors).

The feed industry declined for much of the 1980s and 1990s, resulting in the major multinationals exiting the industry leaving behind firms that they had sold to management or to third parties⁴. These firms struggled to survive and were in decline until the poultry ban was imposed by the GON, leading to significant commercial investment and consequent rapid growth of commercial poultry production. The strong supply response has meant that prices of frozen chickens have not kept pace with inflation. Overall, the demand for meat is increasing rapidly, driven by rising incomes amongst the better off consumer and a high-income elasticity. Consequently, the market for poultry feed is growing, dominated by direct sales to the large commercial farms.

Commercially, prices of beef, goat, lamb and mutton have more than doubled since 1999, reflecting weak linkages between supply and demand. Rearing livestock is widespread, particularly amongst smaller farmers and traditional pastoralists. But compared to the poultry sector, that for cattle, goats, and sheep, has shown very limited development towards more commercial, semi-intensive production systems. In fact, the demand for commercially blended ruminant feeds appears to have declined in recent years, likely due to the limited development of the dairy sector that normally represents the most important demand for commercially blended feeds, excluding poultry.

The limited demand for small and large ruminant commercial feeds is likely due to their relative high cost, limited availability and limited awareness by smallholders on how to use these feeds efficiently and economically. Presently, smallholders feed their animals on crop and milling by-products. A strategic use of least cost, balanced commercial feeds

³ Nigerian Livestock Resources (RIM, 1992)

⁴ Sinha, Sunil, 2005. Analysis of the Linkages between Agriculture and Industry in Nigeria. Contract Number: CNTR 04 5838. Department for International Development, March 2005.

can provide smallholders with opportunities to substantially increase the efficiency and profitability of rearing and finishing animals. Capitalizing on such opportunities will require improvements in feeds and feeding practices, requiring efforts to both raise the technical awareness of producers to improved feed and feeding techniques and increase their access to input and animal markets.

For the rural poor, one of the main opportunity for increasing incomes will come from livestock, particularly goats and sheep. Surveys show that keeping livestock, particularly small ruminants, is concentrated amongst the poor and carried out mainly by women. The rising price of goat meat and lamb/mutton makes this an attractive sector in which to demonstrate MMW4P. The same is true for large ruminants, though such activities will likely target producer associations, cooperatives and merchant groups.

Another important sub-sector, which has been effectively exploited for similar purposes in other West African countries⁵, involves traction animals. Animal traction is widespread in the northern and parts of Nigeria's central belts. The number of traction animals in these regions was estimated in the late 1980s at around 400,000 head. Culled traction animals recruited into a commercial fattening system offers smallholder farmers an opportunity to significantly increase the commercial resale value of animals, reducing overall costs related to animal replacement. Organized farmer associations and/or cooperatives, where animal traction is widespread, provide opportunities to create and/or strengthen commercial linkages with merchants or enterprises processing animal-based products.

Furthermore, it has also been shown (in Mali and Burkina Faso, as well as others) that the extension of animal traction technology promotes the development of mixed-cropping systems and reduces on-farm labor requirements. Evidence from Nigeria has shown such reductions in the order of 35%. Since labor is a major factor constraining growth in smallholder production as a result of high rural-urban migration, promoting animal traction could provide an opportunity to reduce this impact, free up labor and increase the labor balance between the need for earning incomes from farm labor and the need to farm to ensure food security.

In terms of environmental impact there is a positive correlation between the extension of animal traction and the adoption of integrated cropping systems. These systems generally utilize both cereals and legumes as an effective means of maintaining soil fertility (generally a problem with mono-cropping systems). This is an important factor in maintaining and improving yields and reducing the tendency to cultivate ever-increasing acreage simply to maintain existing production levels. Moreover, integrated cropping systems provide farmers with a diversity of products (both subsistence and cash crops) as well as an array of crop by-products that can form the basis of an improved animal ration when combined with a small amount of a commercial concentrate.

From what has been discussed above, it is apparent that one of the major characteristics of livestock product value chains is their fragmentation in term of commercial linkages, particularly in any formal sense. Moreover, they have relatively few linkages with industry. Inherent incentive systems to improve product quality along the entire value chain are presently difficult to achieve due to linkage fragmentation and to the absence of

⁵ The wide spread use of animal traction in cotton-producing areas of southern Mali has provided a livestock resource base for successfully developing intensive-fattening operations for culled traction animals.

industry-wide norms and standards, either with respect to finished animal-based products or live animals. A similar situation exists in commercial animal feed and feed raw material markets.

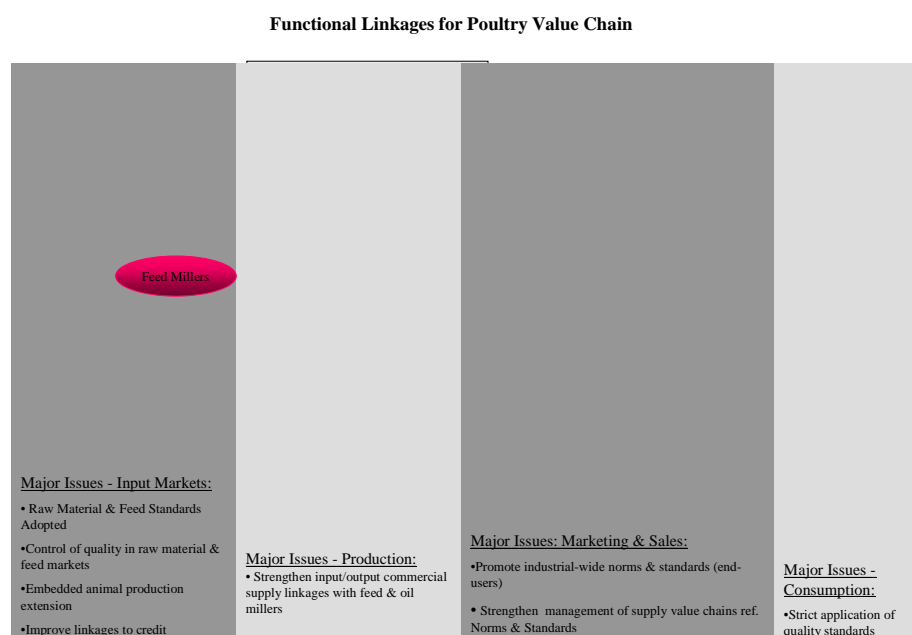
Thus, the strategic pressure points to affect systemic change throughout this system will likely be at two levels. The first is at the level of *industrial end-users* where there is a need to develop and apply industry-wide standards for final livestock product markets. The incentive is to improve the efficiency and management of up-stream value chains that are supplying both live animals and post-slaughter products. The impact would be to structure supply chains based on quality-price criteria, enabling suppliers to begin segmenting supply and providing producers with price incentives to add value at the production-finishing stage⁶. Over time formalizing sales through contracts that specify animal and/or product quality, quantity, price range and supply period needs basically reduce risk for producers by more efficiently linking supply with a specific demand-pull. Under present conditions, however, commercial linkages between industrial end-users and livestock producers/finishers are very convoluted and complex, generally involving multiple intermediaries. This makes getting clear market signals to producers very inefficient and problematic, and for industrial end-users developing these commercial linkages will be a determining factor in securing and improving the efficiency of their supply chains. Building effective relationships with buyers and training them how to be more effective in clearly communicating market needs to suppliers will be critical to this process, but will take time.

A second pressure point involves enterprises willing and capable of strengthening commercial linkages between producers and livestock product markets. The objective would be to strengthen the capacity of producers to better respond to demand, to diversify their market opportunities and to improve on-farm output to respond to value added market incentives. As a result some of the more successful will likely play a more direct and substantive role as players in livestock-product value chains with industrial end-users, while the less-productive can benefit from a diversity of off-farm employment opportunities resulting from the development of value chain-associated industrial and service enterprises.

Such enterprises would ideally have their own livestock production-based commercial markets and/or be service providers to farmers. As such this will ensure that they will benefit (their own market will likely expand) along with efforts to create/strengthen sustainable commercial linkages between livestock producers and livestock and livestock product markets. Commercial producers of animal production inputs fill these criteria and could play such a role, particularly commercial animal feed millers. Promoting improved livestock productivity and ensuring that producers can respond to a demand-pull are essential if producers are going to increasingly purchase production inputs, particularly commercially blended feeds.

⁶ Visits to Maiduguri illustrated the widespread nature of small livestock fattening operations, activities that clearly illustrate segmentation in the red meat value chain. What is less clear, however, is the degree to which these activities are driven by speculation, or by a clear market pull. When interviewed, many fatteners indicated that they frequently just break-even or loose money due to volatile market prices.

As producers become increasingly sophisticated in their capacity to respond to market norms and standards they will demand increasingly more sophisticated and production-specific inputs. Hence markets for inputs will expand and diversify, all to the benefit of input providers. Expanding value-added input markets will enable commercial input producers/suppliers to expand their businesses, diversify their product output, penetrate new markets and create jobs. In the medium term such enterprises should not only be able to absorb an increasing share of rural employment, but also capture an increasing share of value added. By so doing these “rural enterprises” in effect become drivers of change. They play a key role in promoting and encouraging a process that transforms rural economies into systems where non-farm activities become the main source of



income and employment.

Above is a generic diagram of a poultry value chain. To be complete and provide a clear understanding of management and efficiency factors, the linkages in this schematic should contain both quantitative and qualitative data, including all associated cost structures. Unfortunately, such data was not available for Nigeria, but could be collected in the future for specific value chains being addressed by PrOpCom through it’s M&E activities, important information to establish a baseline and with which to measure results and impact.

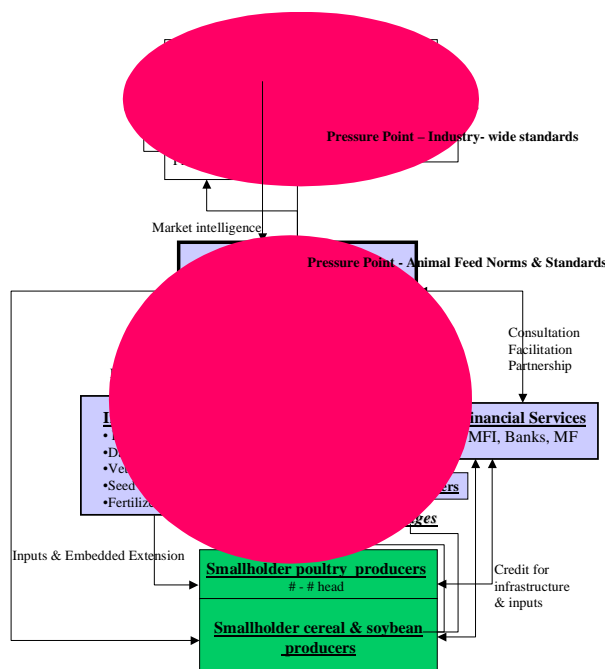
Within the context of what’s been discussed above, the major “driver-of-change partners” seem to be feed and/or oil millers and industrial end-users of livestock products (noted above in red). The incentives driving the chain at both the end-users and millers level are the development and application of norms and standards in product markets (for both animal feed and finished animal products). In the case of *poultry*, at the feed/oil miller’s level, it is proposed to use a “Large Enterprise to Farmer Model”⁷⁸ to frame the

⁷ Large enterprise to farmer model – out-growers are treated as partners rather than just contract growers by providing inputs, technical assistance, some overall management of production – post harvest, etc, and product quality.

⁸ Refer to Discussion Paper No. 7, 2005. Agricultural Commercialization, Value Chains, and Poverty Reduction, Asian Development Bank, January.

implementation process. In this model millers essentially develop partnerships with organized producer groups to supply quality feed raw materials (cereals and oil seeds) and finished broilers and/or eggs, while millers provide high quality feeds or feed raw materials and embedded extension services to producer groups (note diagram below).

Large Enterprise to Farmer Model¹ for Poultry



¹ Refer to Discussion Paper No. 7, Agricultural Commercialization, Value Chains, and Poverty Reduction, Asian Development Bank, January 2005, www.markets4poor.org

When addressing the red meat value chain it is important to consider the fundamental differences in organization and structure from poultry product value chains. In the case of commercial input linkages related to poultry feeds and feeding techniques, it should be noted that they are generally based on a “formula production” approach. The historically strong linkages between industrial producers and processors, on the one hand, and research and development institutions, on the other, have resulted in the development of highly efficient, technically sophisticated production/ management systems that have been transferred and diffused globally.

Such is not the case with ruminants, where the approach is less “formula” oriented and where standardization of production/management systems on a global basis has been more of an adaptive process than out-right technology transfer. When compared to poultry, commercial feed markets linkages for ruminants are much weaker and less well developed, possibly reflecting a lack of appreciation on the part of both producers and finishers, as well as feed millers, of the productivity advantages to be achieved through the use of improved feeds and feeding techniques and the failure to diffuse information on economically viable ruminant feeding programs based on the use of locally formulated, nutritionally balanced, commercial feeds. End users for these improved feed and feeding programs would likely include, in the case of large ruminants, sedentary mixed farmers, pastoral producers, cattle merchants and butchers and women’s groups in the case of small ruminant production.

In the case of ruminant producers, strengthening raw material commercial linkages with both feed and oil millers would also strengthen on-farm feeding efforts by providing incentives for diversifying crop production and increasing crop by-products feedstuffs by enhancing crop productivity and providing commercial product outlets. Organizing animal feed raw material value chains would benefit both feed and oil millers. The development of commercial feed markets for ruminant feed would substantially diversify commercial feed markets.

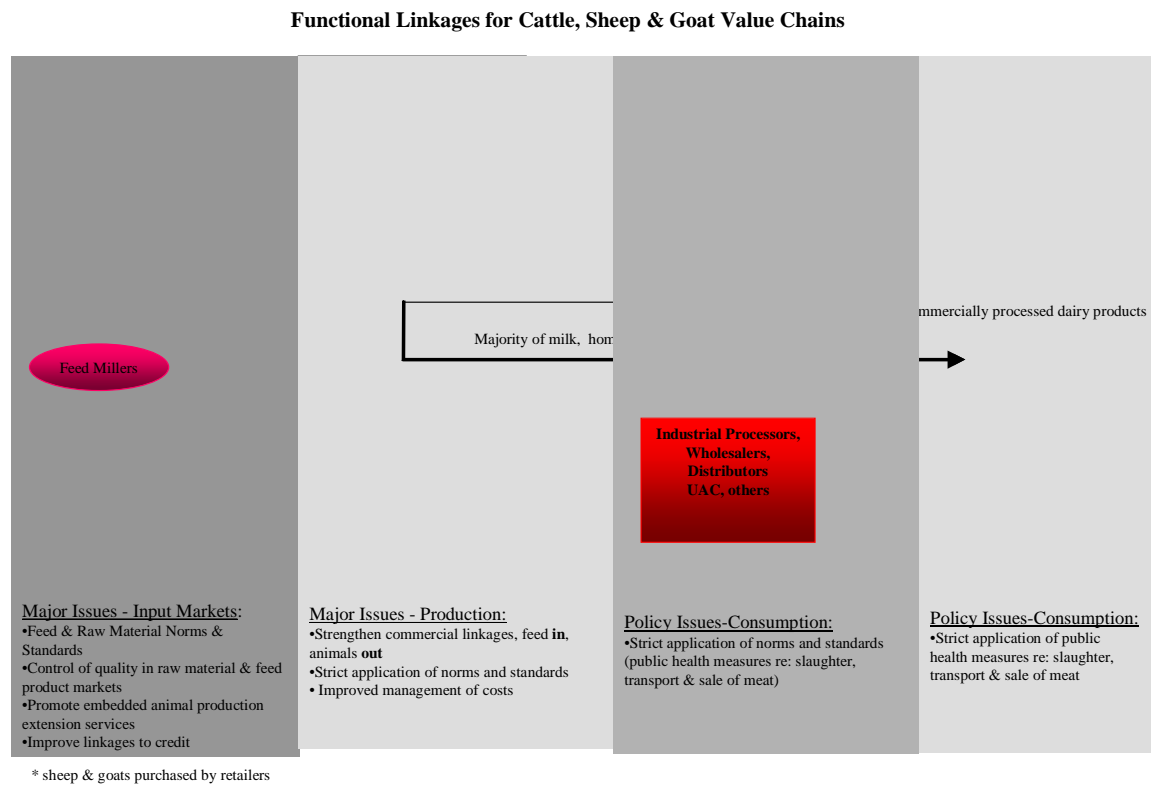
By developing embedded extension services, feed providers would increase awareness of producers to the productivity-increasing effects of improved feed and feeding practices, promoting the sale of commercial feeds and diversifying markets and increasing market share. Targeting these efforts in the red meat value chain, where the impact period is relatively short and existing conditions are favorable, would make awareness campaigns more effective in the short term than in the dairy sector where input packages and infrastructure needs are much more costly and complex than for the red meat production.

In Nigeria, as elsewhere in West Africa, ruminants, and especially cattle, are still largely managed according to traditional practices, driven more by a desire to increase cattle-wealth and exploit what is considered a “free” natural resources base, than by demand and market-determined production efficiencies (competitiveness). This is changing, as noted by the increasing occurrence of semi-intensive production operations. This intensification process is obviously market-driven, operators fatten animals for particular markets niches because it is profitable, but overall, fattened animals remain a small percentage of total sales probably due to inefficient and weak market linkages. Consequently, the vast majority of cattle are reared and sold within commodity systems where market are largely un-segmented and commercial incentives and linkages are weak and fragmented.

As noted previously, both the demand and cost of animal-based products has, and likely will continue to rise, largely due to inefficient supply linkages, but also due to an increase in real demand (demographics and purchasing power). The substantial increase in prices for animal products is likely the result of both speculation (seller’s market) and production-marketing inefficiencies. In this regard, rearing and finishing ruminants must become more technically based (reducing and better managing production costs) and focused on specific market segments (where demand characteristics determine the level of inputs). Being able to profitably finish animals conforming to specific market requirements must become the basic objective of producers. To do so they need efficient and reliable market information and the capacity to competitively respond to demand.

In developing the commercial feed market for fattening ruminant animals one must pay close attention to overall production costs. These are generally a function of the capacity of different breeds of animals to efficiently respond to particular feeding regimes, the availability of locally available feed ingredients (crop residues and by-products, industrial by-products) both in terms of quantity and cost and feed management. Monitoring gains, controlling daily feed costs and *not overfeeding* are key management tasks. Failures to design and manage finishing programs based on real market intelligence can easily wipeout potential profit margins. Since more than 70% of the final price of red meat and red meat products is a function of live animals costs, the rearing and finishing of ruminant animals must become more cost-quality conscience for value chains to remain competitive.

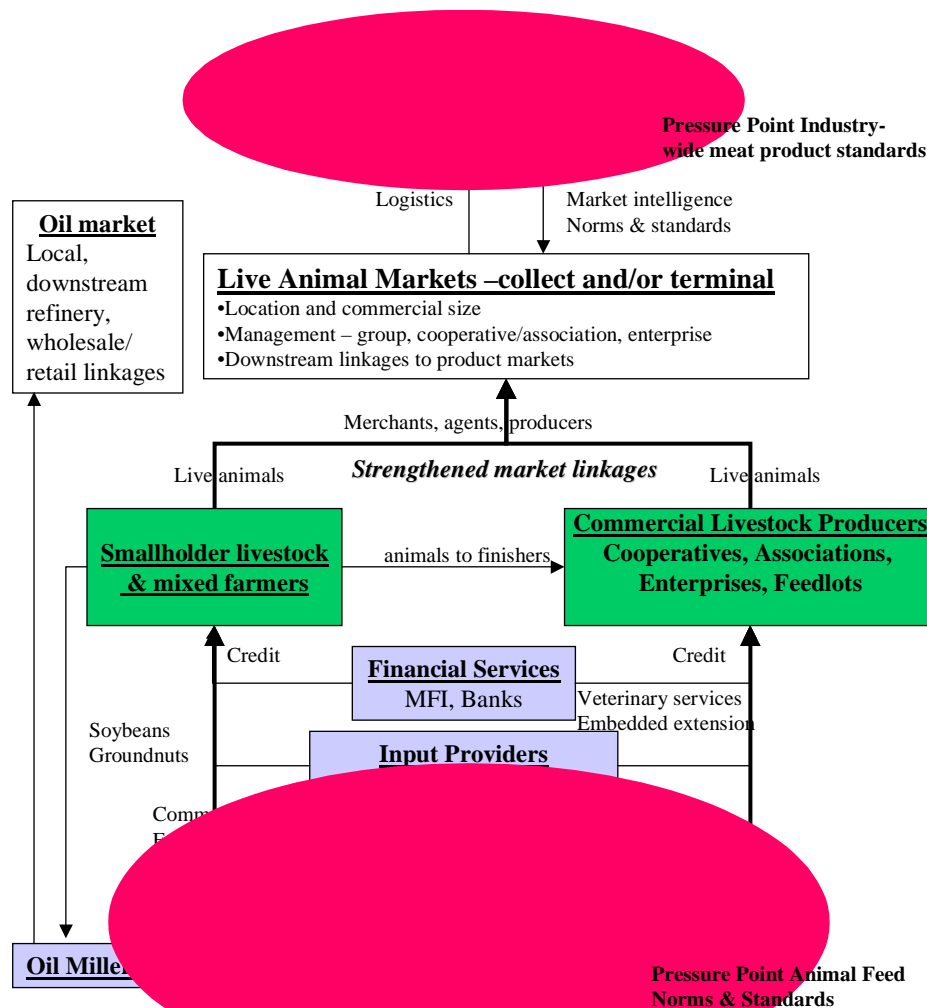
For cattle and small ruminants it is proposed to adopt a similar approach to that presented



for poultry, namely the “Large Enterprise to Farmer Model⁹”. Above is a general schematic of product flows in ruminant –based value chains, and below, a schematic of the Large Enterprise to Farmer Model.

⁹ Ibid.

Large Enterprise to Farmer Model¹ Cattle & Small Ruminants



¹ Refer to Discussion Paper No. 7, 2005. Agricultural Commercialization, Value Chains, and Poverty Reduction, Asian Development Bank, January 2005, www.markets4poor.org

V. Conclusions & Recommendations for PrOpCom's Technical Program Development

Enterprise development is a powerful engine of agricultural transformation and nurturing local entrepreneurship should be a strategic consideration in technical program development. Moreover, agribusiness is an important vehicle for promoting agricultural commercialization. Consequently, technical programs should target “rural” agro-enterprise development. In fact making markets work for the poor involves two basic measures: enabling access to effective markets and creating viable income-generating activities for the poor, which is in effect, a major component of business development¹⁰. It should also be noted that initially program planning should not focus only on farmers since this will not likely generate the growth necessary to promote systemic change in

¹⁰ Refer to Discussion Paper No. 7, 2005. Agricultural Commercialization, Value Chains, and Poverty Reduction, Asian Development Bank, January.

targeted value chains because within these systems farmers are not the major drivers of change, agro-business is.

Within an agro-business context, PrOpCom's program should be focused on resolving those dys-functionalities (bottlenecks¹¹) in targeted value chains that have a good probability of leading to systemic change. These dys-functionalities can include, but are not limited to, low innovation, poor communication, low organizational capacity and low rural investment. Thus, the operational technical strategy for program development and implementation would appear to involve:

- ❑ a business development approach led by agro-business drivers of change,
- ❑ identifying product market incentives that would commit selected agro-business to addressing specific value chain dys-functionalities that could lead to systemic change, and
- ❑ using targeted value chains as the implementation framework.

For value chains to be effective, enterprises will be the leading actors, and these will have to link in productive and creative ways with smallholder farmers. Consequently, interventions should focus on:

- ❑ Promoting the organization of business linkages to increase collaboration among stakeholders
- ❑ Promoting effective coordination
- ❑ Facilitating the establishment of rules of coordination and good governance to promote the distribution benefits among value chain stakeholders (win-win)
- ❑ Promoting competitiveness as the most sustainable way to meet consumer demands
- ❑ Encouraging innovation to maintain competitiveness

In addition, and as already discussed, interventions should: (1) ensure that farmers benefit from the growth of demand for agricultural produce, (2) increase agricultural productivity by strengthening input linkages and developing embedded extension services within the private sector, and (3) promote competitiveness and quality assurance (verifiable certification) as core objectives in value chain improvements.

Given the present configuration of livestock and associated product markets and the need to have an agro-industry focus, a modified Large Enterprise to Farmer Model is suggested for operationalizing interventions. In this model producers are treated as partners rather than just contract growers where the enterprise provides inputs, technical assistance, some overall management of production and post harvest practices, and product quality control techniques and procedures.

Finally¹², in the medium to long term this approach should generate some of the following impacts:

¹¹ Ibid. **Bottlenecks** – low innovation (implying low productivity, low comparative advantage and missed opportunities); poor communications (failure to capitalize on the success of others or be effectively linked); low organizational capacity (failure to exploit market opportunities that generally require the coordinated efforts of several players); low private investment in rural areas – (encouraged by promotion of associations of producers and creation of commercial alliances to facilitate larger investments – low investments means low growth)

¹² Refer to Discussion Paper No. 7, 2005. Agricultural Commercialization, Value Chains, and Poverty Reduction, Asian Development Bank, January.

- ❑ Improve the capacity of rural enterprises to increase their profitability that can also have a multiplier effect on the incomes of others in the area.
- ❑ Creation of off-farm rural and urban jobs from the development of rural enterprises.
- ❑ Improving the quality and stabilizing the prices of agricultural commodities through improved productivity of agro-businesses.
- ❑ Improved value chain linkages will result in higher valued goods and services at more competitive costs, developing opportunities in trade, both domestic and export.
- ❑ Strengthened farmer to market linkages, eventually resulting in “shorter” marketing chains and increased market efficiency

ANNEX I

A. Trip notes from Kano, Kaduna & Maiduguri

17-21 April 2005

The team arrived in Kano on Sunday, April 17th and began on Monday the 18th to focus on enterprises considered to be potential drivers of change in strengthening linkages between smallholder producers and animal feed and animal product markets.

Input suppliers of animal feed, primarily for poultry, veterinary medications and day-old chicks included Animal Care Ltd., Garko Farms and Phed Nigeria Ltd. Commercial oil millers included Fortune Oil Mills Nigeria Ltd. and P.S. Mandrides PLC. Potential financial partners included The Union Bank of Nigeria, First Bank and the Nigerian Agricultural Cooperative and Rural Development Bank. The Kano State Agricultural and Rural Development Authority, the state extension service, could be an important partner providing a functional public sector linkage during project implementation.

Fortune Oil Mills Nigeria Ltd. appears to be a major player, both locally and nationally, in the production of groundnut and soybean cake. Their general manager, Alhaji Ibrahim Mohammed, estimated monthly production at approximately 3,000 tons (including both groundnut and soybean), with daily production oscillating between 100 and 200 tons (roughly 25% cotton seed, 30% soybean and 45% groundnut). Soybean cake is used by local millers of poultry feed, but the majority of supplies are apparently distributed throughout the country, especially for poultry feed producers in southern regions. Most groundnut cake is distributed to cattle producers in major cattle production areas, especially Jos, while cotton seed cake is generally purchased by local, small feedlot operators.

Fortune Oil Mill's supply chain is composed on an extensive network of agents that buy beans in local, village markets and apparently there are very few problems in supply. According to their general manager, local markets for both feed inputs and oil are presently depressed due to an over supply of eggs and decreased domestic demand for oil (reasons not clear). Their present production of oil has decreased from 600 tons per day in late 2004 to 150 tons presently.

When queried if they were interested in diversifying their product line by venturing into feed production, their general manager responded with a categorical, No. According to the general manager Fortune did not want to jeopardize its current market with large feed producers by adopting a competitive posture.

While Fortune Oil Mill apparently has few problems in raw material supplies, this is not the case for P.S. Mandrides, PLC. According to Yusuf Minjibir, the personnel manager, his company intends to compress about 12 staff positions due to poor raw material supplies that have delayed the startup of their feed mill activities. These supply problems stem from P.S. Mandrides inability to identify sources of *quality seeds* for crushing. The intense competition for raw material supplies has apparently results in a sellers market with little regard to quality. Even though P.S. Mandrides pays a "premium" for quality (2,000 to 4,000 Naira per ton), it is insufficient to promote producer efforts to increase quality. Additional supply problems were also cited. Last year IITA approached P.S. Mandrides to buy groundnut seed from IITA-cooperative producers that were having marketing problems. Negotiations were not successful, farmers preferring to keep their groundnuts hoping for an increase in market price that never materialized. Further

discussions revealed enterprise interest in examining the development formal contract arrangements with farmers, essentially based on the general concept of the large private enterprise model¹, as a strategy to improve their raw material supplies. P.S. Mandrides has already indicated their interest to participate in a stakeholder's workshop.

Animal Care Services Konsult Nigeria Ltd. is a farmer input supply and consulting service with offices throughout Nigeria. Their services focus on the supply of animal feed (essentially poultry and fish) and veterinary inputs. Their feed production in Kano is approximately 360 tons per month. In addition they provide technical assistance to producer and producer groups, including small village-level producers. Their feed production activities could provide an opportunity for Animal Care to provide facilitation and strengthen linkages with smallholder raw material producers, particularly from organized producer groups. Presently, one of their primary constraints, is effectively communicating with their diverse clientele regarding the adoption of improved production practices, a factor they related to the limited education and production experience of most smallholders.

Animal care is very interested to take part in a stakeholder's workshop.

Phed-Agro-Vet Nigeria Ltd. has a similar range of services to Animal Care, but in addition they have a large commercial poultry farm (approx. 60,000 birds) in Kano; a breeder farm (approx. 30,000 reproducers) in Delta State; and a hatchery of approximately 30,000 in Lagos State. They supply consulting services across the range of sector operators, ranging from large commercial producers to small village-level producers. In this regards Phed-Agro-Vet Nigeria Ltd. has had experience implementing government-sponsored extension programs to promote village-level poultry production as a means to increase rural revenues, especially for women. They appear to be very interested in providing capacity building services to rural producers, though the mechanisms to ensure that such services result in sustainable impacts is not clear.

While Fortune Oil Mills indicated that local demand for oil cake was presently depressed due to an oversupply in the egg market, Dr. Philip Okwuada of Phed-Agro-Vet insisted that this was not the case and, in fact, present supply cannot keep pace with demand. He also noted that previous efforts in working with rural producers showed that production lagged significantly behind even "rural demand" and our perceptions of the need to strengthen commercial linkages to product markets while undertaking efforts to improve productivity may be necessary in the future, but the current priority is to meet rural demand. Dr. Okwuada expressed an interest to participate in a stakeholder's workshop.

The Nigerian Agricultural Cooperative and Rural Development Bank is the major formal lender to medium and small agricultural producers in Kano. Our meeting with the director of the airport road branch of the NACRDB revealed a commitment to increase lending to credible producers. Presently, they have only provided two "macro" loans of between 3 and 4 million Naira, but their micro credit portfolio has financed over 60 projects during the past three years. Micro-finance loans are less than 250,000 Naira, with most being between 150,000 and 400,000 Naira. Interest rates, which are subsidized by the Federal Government, are 8% for micro-credit and 19% for macro loans. These figures compare favorably with most commercial banks where interest rates generally vary between 23% and 28%. Their major problem is repayment (% of defaults not clearly specified in our discussions), a problem apparently exacerbated by the fact that NACRDB is a public sector entity and some creditors do not feel obliged to repay the government.

Discussions with Ali Mohammed Rimindako, representative of the Miyettialla Cattle Breeders Association of Nigeria in Kano (an NGO), revealed the long-term, highly political ambitions of this Fulani national association that is centered on negotiating with the Federal Government the allocation of extensive grazing reserves to begin the sedentarization of a traditional migratory people. In Kano the association has approximately 255 registered members (families) and hopes over time to integrate families into sedentary production systems.

This effort will require support efforts to adapt migratory, extensive cattle production practices to more intensive, sedentary practices will require training in veterinary issues, production and fattening techniques and some basic training in business practices and simple business tools. In addition, the association's extensive experience in commercializing animals could provide an opportunity to reinforce and broaden commercial market linkages to a wide spectrum of smallholder sedentary producers. Miyettialla - Kano is prepared to participate in a stakeholders' workshop.

On Tuesday, meetings were scheduled with livestock merchants in Kano. A visit to the animal holding yard near to the Kano abattoir assembled more than a half a dozen merchants involved in the buying and selling of cattle in the Kano, as well as other southern markets. Among these, Alh Ubale Abdullahi, a senior member of the Kano Butchers' Association expressed considerable interest in working with the project to develop live animal market linkages with smallholder rural producers.

In this regard Alh has already initiated on a very limited scale cattle fattening opportunities for smallholders possessing feedstuffs, but with little experience in animal fattening. In these cases Alh provides animals to farmers to fatten and then buys them back once fattened. These activities have involved both individual as well as groups of producers and with training and organizational support from service providers could substantially diversify on-farm production activities and increase live animal market linkages for smallholders.

The need for such linkages was highlighted during visits to several smallholder operations in the peri-urban Kano area. Smallholders fatten animals with little or no information regarding the market they are ostensibly supplying. This frequently results in sales that lose money for the producer because fattening is undertaken in the absence of any idea of prevailing prices, types/condition of animals demanded and what markets are offering the best prices. Linking smallholders with merchants or other market operators could identify commercial opportunities which otherwise would not be known or inappropriately managed, which is often the present case. Ensuring a capacity to function as a real commercial partner with market operators, smallholders will need to be part of organized groups such as cooperative marketing groups and trained in basic commercial practices. In this model merchants/market operators/input providers could function collectively as agents of change in collaboration with service providers capable of increasing smallholder commercial capacity by providing inputs and access to financing, creating a direct market linkage that could make live animal markets work better for resource limited smallholders. Alh Ubale Abdullahi is interested in participating in a stakeholders' workshop.

Yusuf A. Umar operates Electro Data Systems Ltd. in Kano, and at the same time is a prime mover in Kano's Cattle Breeders Association. He is presently developing a commercial, integrated farming operation focused on dairy and poultry production. Most importantly, however, he is working with fellow farmers and former extension service

specialists in developing new, least cost cattle rations, plans to begin producing poultry feed and is very interested to experiment with an out growers model to increase the production of eggs and poultry meat, serving as a commercial facilitator for out growers. He seems very serious and professional and further discussions seem warranted to assess a potential role in project activities.

A brief follow-up visit was made to Chimande poultry operation. This operation is managed by the owner's wife and presently focuses on producing and selling cockerels. However, future plans call for expansion into broiler and egg production, as well as expanding the production of laying and broiler stock. The manager is very interested in piloting the development of an out growers production marketing model where Chimande provides, either on credit or some form pay-back arrangement, inputs and buys back eggs and broilers. Due to previous problems in the efficient commercialization of broilers, it is likely that Chimande would opt to initially focus on egg production, though this might present other potential management problems at the producer end. Chimande also want to focus initially on mobilizing women's groups in several local government areas around Kano. Chimande is also prepared to participate in a stakeholder's workshop.

It appears that Kano offers several possibilities to develop *pilot initiatives* focusing on poultry and ruminants, involving both feed millers, merchants, commercial agents and input providers in partnership with smallholder groups to build new and strengthen existing product market linkages.

ECWA – Rural Development Ltd., Kaduna (Dr. Israel J. Barde), is a commercial, church-based rural development organization specializing in providing inputs (feed, day-old chicks and veterinary medications) for smallholder poultry production and some limited support for cattle and small ruminant production. Located throughout Nigeria, ECW has its headquarters in Jos. ECW has been providing support to rural smallholders since 1976 and its Kaduna representative estimates that they have impacted more than 100,000 rural households in Kaduna, with more than a million households being impacted nation-wide.

ECWA's targets rural poultry producers having between 50 to 1000 birds, 300 birds on average. At headquarters they have a feed mill (20tons/day) that routinely produces poultry feed, with ruminant, pig and dog feed produced on demand. Their hatchery produces approximately 100,000 chicks per week and fertile eggs from a flock of 10,000-parent stock.

ECW has in the past facilitated contact between buyers in Kaduna and their client-producers, though the demand for facilitating such contacts have diminished in the past several years (due, according to ECW, to better and more permanent contacts between producers and wholesalers). ECW expressed an interest in expanding such contacts in an effort to further develop their own clientele.

With regards to feed, as millers, they are interested in exploring opportunities to formalize the purchase of cereals and soybeans from smallholders, ideally staggered over several months. Actually their present raw materials supply chain requires the immobilization of considerable resources to stock cereals and soybean meal/cake to present the need to intervene in the market when raw material prices are very high. Alternatives to this system (possibly a warehouse receipt program financed by a local financial partner) would enable them to substantially reduce their bank charges presently incurred from a line of credit necessary to maintain a level of liquidity necessary for operations. In fact in 2003 they paid more than 36 million in interest, mostly due to their

feed operations. Apparently their veterinary activities consistently generate “reasonable” profits (10 million Naira in 2004).

ECW considers that the Kaduna area market for both eggs and broilers is still expanding. Several years ago it was difficult to place broilers and ECW had to reduce their program accordingly. Today, producers can sell all that they produce. ECW, Kaduna, suggested that their headquarters be contacted for further discussions and to participate at a stakeholders’ workshop.

A follow-up visit was accorded to Dr. E.O. Izegaegbe, Commercial Director, Mr. Ndife Joel, Promotions and Marketing, and Dr. P.M. Esuga, Director of Operations of Feed Masters Ltd. This enterprise remains interested in examining with the project different modalities for expanding their business through the creation of commercial linkages with smallholder producers, whether in terms of birds and/or eggs, or from the standpoint of raw materials for the production of blended feeds. Feed Masters Ltd. is very interested to participate in a stakeholders’ workshop.

A brief visit was undertaken with Dr. Alhadji Tidjani Ibrahim of NLPD. Dr. Ibrahim has a vast knowledge of livestock development efforts in Nigeria, as well as associated programs dealing with mixed-farming systems and production of forage crops. He has also had some very relevant private sector experiences that could be of future benefit to the project (slaughter and transport of refrigerated carcasses to Port Harcourt for cafeterias servicing oil companies). Based on our discussions I suggest that the project evaluate opportunities during startup and implementation to better profile beneficiary groups and their locations, to assess proposed technological interventions and to undertake external monitoring/evaluation activities for livestock-based programs.

Strengthening commercial market linkages for live animals originating from smallholder fattening and improved feeding operations is a basic requirement if such producers are to be a sustainable and expanding market for commercial feed producers, and if they are to effectively profit from investing in the production of higher quality animals.

On a national scale, northern Borno State is a major commercial center for livestock, particularly cattle. Understanding the major elements in this value chain, its constraints and opportunities, is very important in identifying commercial opportunities that can drive the creation and/or the strengthening of linkages between major players and smallholder producers. Consequently, the team undertook a rapid reconnaissance trip to Maiduguri, the commercial livestock center of this region. The majority of our discussions were held with the Borno State Livestock Traders Association (BSLTA), and its chairman Al Hadji Mohammed Kliia.

Although this organization is only statewide, it does have contact with other associations in neighboring states. Within Borno State, it has roughly 1,000 registered members, organized in municipal chapters. 30 to 40% of its membership comes from the Maiduguri area. Its main mission is to promote and protect the business interests of its members, including merchants, butchers and producer-fatteners, including both merchants and fatteners.

The BSLTA manages (controls?) a large part of total sales originating from the Maiduguri market. Although most respondents indicated that present sales appeared to be below those of previous years, during our visit more than 15, lorries, each capable of transporting on the average of 25 head of cattle, were waiting in the market area to

transport live animals South, either to Port Harcourt or Lagos, the principal southern markets. Moreover, cattle and small ruminant sales in this market were said to be about equally divided between local consumption and shipments of live animals to the South. If the following market figures are basically correct, then daily shipments to southern markets would amount to approximately 175 cattle (7 lorries at 25 head/lorry) and 225 small ruminant (2-3 lorries).

Discussions indicated that daily sales could amount to over 900 head, including 300-400 cattle, 400-500 small ruminants and 75-100 camels. Of this number it was stated that approximately 50% are sent South (mostly cattle and small ruminants) and the remainder is slaughtered locally. With Maiduguri having an estimated population of 3 million inhabitants and assuming that cattle dress at roughly 30% meat and sheep and goats at 35% and camels at 30% (from what we were told, meat is generally sold boneless and if the client wants bones they are added “free of charge”), this would amount to an average daily per inhabitant meat consumption of 6.12 gm from cattle/per/d, 0.92 gm from small ruminants/per/d and 3.8 gm from camels/per/d¹³. Assuming that in Maiduguri camels (in general a less expensive meat) replace about one-half the estimated protein intake from small ruminants and virtually all that estimated to come from fish and poultry, then average daily protein intakes are similar to those published by FAO¹⁴. During our visit, we observed very little fish and poultry being consumed.

Supplying local demand for meat is a major preoccupation of livestock merchants and butchers in the Maiduguri market. Though the shipment of animals to southern markets only represents a small percentage of the total estimated meat consumption from southern markets¹⁵, it is important for traders, especially since these markets provide premium unit prices. However, transport problems and associated costs presently pose a major constraint for shipping live animals to the South.

Illegal roadblocks and taxes on the part of local and state authorities significantly reduce, and render in some cases the expedition of live animals a non-profit making undertaking. Consider the following cost structure for shipping one truckload of cattle to a peri-urban livestock market in the Lagos area.

- ❑ Each truck can transport an average of 25 head of adult animals
- ❑ Veterinary certification procedures at the Maiduguri market cost about 2,500 Naira/truckload plus 1,500 Naira for loading
- ❑ The salary of two attendants to ride in the back to survey animals costs 15,000 Naira/attendant
- ❑ Truck rental costs about 120,000 Naira/one-way
- ❑ If additional feed is taken for animals that have been fattened it costs about 10,000 Naira (to maintain animals during transport and at the terminal market until sale)

¹³ Cattle = 175 head x 350 kg live weight x 30% dress = 18,375 kg/3,000,000 = 6.12 gm/per/d; small ruminants = 225 head x 35 kg live weight x 35% dress = 2,756 kg/3,000,000 = 0.92gm/per/d; camels = 85 head x 450 kg live weight x 30% dress = 11,475 kg/3,000,000 = 3.8 gm/per/day. Red meat contains on average 22% protein, 9.97 gm meat x .22 = 2.19.

¹⁴ FAO estimates total daily protein intake from beef, small ruminant and poultry at 2.2 gm/per/d.

¹⁵ FAO estimates total annual meat consumption at 1.1. to 1.3 million tons, 26% cattle, 9% sheep, 14% goat, 20% porcine, 20% chicken and about 11% game meat. With the Southwestern and Southeastern regions having 45% of the population, then proportional consumption figures would indicate that roughly 125,000 MT of cattle meat are consumed annually, with the Maiduguri market supply only about

- ❑ Thus total transport costs at this stage amount to $2,500+1,500+30,000+120,000 = 154,000$ Naira for non-feedlot conditioned animals
- ❑ Between Maiduguri and Lagos trucks pass through at least 8 States and multiple local administrative districts, each of which levies a tax, which on average amounts to about 6,000 Naira/state-LAD or about 50,000 Naira for the journey.
- ❑ In addition to the rent seeking, these road blocks can increase transport time from an estimated average of 26 hours to about 2 days
- ❑ Merchants estimated that the average sale price of non-feedlot fattened animals in Lagos markets to be about 68,000 Naira, compared to an average purchase price of from 50,000 to 55,000 Naira.
- ❑ On a per head basis, total costs, FOB Lagos, amount to $52,500+8,160$ ($[154,000+50,000]/25$) = 58,160, providing a margin of about 8,000 Naira under normal conditions (merchants cited about 3,000 Naira but their figures did not coincide with their statements and current market prices)
- ❑ It is clear that this margin can greatly vary depending on terminal market prices, whether or not animals are kept for several days before sales or there are mortalities.
- ❑ Mortality generally amounts to about 2-3%, higher in highly conditioned animals
- ❑ What is clear is that illegal rent seeking amounts to at least 25% of margin and under some conditions much higher, considerably reducing the competitive margins associated with live animal transport to the South.

The Maiduguri market is surrounded with small fattening operations, adding value to thin and poorly conditioned animals arriving from collect and secondary markets, as well as animals arriving from neighboring countries such as Chad, Cameroon and Sudan. These small feedlots, generally operated by merchants and/or butchers, fatten two to three rotations per year, primarily during the dry season. Feeding consists mainly of locally available crop by-products (cowpea forage) and milling by-products such as millet, sorghum and wheat bran. Some cottonseed cake is used as a protein supplement, though most rations appeared to be energy rich and well adapted to fattening adult, energy-deprived animals.

BSLTA members were interested in improving their fattening and commercial operations, particularly in resolving problems associated with illicit road taxes. Some opportunities exist to perhaps improve fattening in terms of feeding time and quantity of ration fed, but in general these producers appear well schooled in animal fattening techniques, though more information is needed on feed raw material and finished feed costs to identify methods to improve the efficiency and the profitability of fattening. BSLTA indicated little interest in expanding fattening operations to include new, and perhaps smallholder, producers.

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B. Nigerian Livestock Survey – Summary Conclusions

Nigerian Livestock Population Estimates

CHICKENS	82,400,000	OTHER POULTRY*	31,900,000
GOATS	34,500,000	PIGS	3,500,000
SHEEP	22,100,000	DOGS	4,500,000
CATTLE	13,900,000	CATS	3,300,000
DONKEYS	900,000	RABBITS	1,700,000
HORSES	200,000	GUINEA PIGS	500,000
CAMELS	90,000	GIANT RATS	60,000

* Includes: pigeons, ducks, guinea fowl and turkeys.

Poultry

Poultry outnumber all other forms of livestock in Nigeria, and, not surprisingly, are found throughout the country. Although pigeons, ducks and Guinea fowl, and some turkeys, are also widely kept, chickens are by far the most common.

Small Ruminants

Small ruminants are almost as ubiquitous as poultry, though not so numerous. Nationally, there are estimated to be a total of 56.6 million head, with goats outnumbering sheep by three to two. Although some seasonal movement of pastoral sheep does take place, the great majority of small ruminants are sedentary village livestock and their patterns of distribution mirror that of human settlement.

Goats

There are three main varieties of goat in Nigeria: the West African Dwarf, the Sokoto Red and the Sahel. Goats are renowned for their hardiness and can survive in most environments: West African Dwarf goats are kept in the forest zones and in the Middle Belt; Sokoto Reds are kept throughout the north; and Sahel goats are restricted to a strip along the frontier with the Republic of Niger. Although pastoral Sahel goats *are* found in the northern semi-arid zone, the great majority of goats are kept in villages. The most common production system is that of seasonal confinement. Northern goats were found to be markedly more productive than West African Dwarf goats, with lower ages at first kidding and shorter kidding intervals, though they produced fewer kids per kidding.

Sheep

There are four main types of sheep native to Nigeria: the Balami, Uda, Yankasa and West African Dwarf. Balami and Uda are kept in the semi-arid regions, West African Dwarf sheep in the south and Yankasa throughout the country. Sheep are the second most

numerous pastoral species, and small flocks accompany many cattle herds in the north and in the Middle Belt.

Comparison of pastoral and village stock shows that pastoral animals are generally more productive. The productivity of West African Dwarf sheep was substantially lower than that of other breeds. All Nigerian sheep are used for wool, but are rarely milked. In the north they are regularly eaten and form part of every-day protein supply, but there is also a marked variation in demand coinciding with religious festivals. As a result there are dramatic seasonal price fluctuations, and in some areas household fattening of sheep for sale is a major economic activity.

Cattle

Cattle are found throughout Nigeria, but are most common in the northern two thirds of the country. Seasonal transhumance does take place, but is generally of limited extent. Maps 5 and 6 contrast the observed distribution of cattle during wet and dry seasons. Almost half the total cattle population is permanently resident within the sub-humid zone. Humped zebu cattle are by far the most common, but limited numbers of keteku, muturu and kuri cattle occur in south-western, southern and north-eastern parts of the country, respectively.

Pigs

The traditional Nigerian black hairy pig is gradually being replaced by various exotic breeds including the Large White, Landrace, Hampshire and Duroc. Pigs are generally kept under systems of seasonal confinement in the north and Middle Belt, but are usually confined all year round in the south, except in the Niger Delta region. Pigs must be given supplementary feeds, and in village systems the lees of beer are often combined with household scraps for food. The distribution of traditionally managed, small scale, village based, production is shown in Map 7. The production of pigs is obviously profitable and continues to spread in many parts of non-Muslim Nigeria.

Intensive pig rearing is economically viable on the periphery of large cities because of the availability of industrial by-products, particularly brewers' grain. Units of between 50 and 200 pigs kept in concrete pens are common, especially in the densely populated regions of the south. Commercially managed piggeries with more than 5 breeding sows account for about 3% of the total estimated pig population of 3.5 million.

Established Trends for the Future

Agricultural Expansion and Environmental Change With the continued growth of human population, competition for limited land resources has steadily increased over the years, and there has been a progressive expansion of settlement and agriculture. This process is taking place throughout Nigeria, but is most marked in the north and south, where population densities are highest.

Expansion into the less densely populated Sub-humid Zone, or Middle Belt, is channeled by an ever-widening road network and accelerated by the increasing urban demand for food and fuel. Deforestation continues apace, vegetation and land use patterns are being transformed and hunting has eliminated wildlife from many areas. The natural environment is, thus, experiencing a period of unprecedented change. Conspicuous signs of land degradation, in terms of the extent of bare ground and erosion, are associated with

the highland areas of the Jos and Mambila Plateaux. Decline of Tsetse and Trypanosomiasis Tsetse (*Glossina* spp.) and trypanosomiasis have for many years been regarded as the most important constraint on cattle production within the Nigerian Middle Belt. Nowadays, with almost half the national cattle herd resident in that region of the country throughout the year, this obviously can no longer be the case.

Deforestation and the removal of wildlife have greatly reduced the natural habitats and wildlife hosts of tsetse over much of the country (Bourn, 1983). Gradually, this has led, through natural selection and co-adaptation, to the evolution of milder forms of the disease, and the development of tolerance to trypanosomiasis amongst some zebu cattle populations.

Towards Mixed Farming

In addition to the more overt, physical aspects of agricultural expansion and environmental change referred to previously, the National Livestock Resources Survey has also confirmed a variety of other more subtle, qualitative changes taking place within local systems of agriculture. For example: the marked reduction in pastoral nomadism; the widespread sedenterization of pastoralists and their adoption of crop cultivation in addition to keeping livestock (van Raay, 1975); the uptake of animal husbandry and fattening of livestock by arable farmers (see Map 8); the utilization of crop residues by livestock in exchange for dairy products and/or manure; and the spread of animal traction for ploughing and carting (see Map 9).

Collectively, these incremental changes are indicative of a progressive and widespread trend towards mixed farming (FAO, 1983; and McIntyre et al., 1992). The process is now firmly established in Nigeria and the further integration of livestock production within local farming systems is destined to become one of the major strategic goals of livestock development in Sub-Saharan Africa (Winrock International, 1992).

Urbanization

Urban populations in Sub-Saharan Africa are estimated to be increasing at 6-7% per annum, twice the overall growth rate for the region as a whole, and account for almost one third of the total human population of Africa (World Bank, 1989). As this trend continues, increased urban demand for food will create new markets for produce and promote the commercialisation of agriculture in peri-urban environments (Winrock International, 1992).

The findings of the Nigerian Livestock Resources Survey certainly lend support to this scenario, with sizeable livestock populations being found in and around most urban areas, either as backyard stock, or as commercial holdings. Poultry farms and piggeries are by far the most common form of enterprise and are, for obvious logistic reasons, usually located within easy access of urban centers.