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# Survey on small-scale urban and peri-urban livestock systems in Angiang province

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## Appendix

This thesis is based on the following papers, which are referred to in the text by their Roman numerals:

I. Ngo Thuy Bao Tran and R. Brian Ogle, 2005. Survey on small-scale urban and peri-urban livestock production in Long Xuyen City.

II. Ngo Thuy Bao Tran and R. Brian Ogle, 2005. Survey on small-scale urban and peri-urban livestock production in Chau Doc town.

**List of abbreviations**

| | |
|---|---|
| AI | Artificial insemination |
| GDP | Gross Domestic Product |
| $km^2$ | Square kilometer |
| NM | Natural matting |
| No. of hh | Number of household |
| VND | Vietnamese dong |

## 1. Introduction

The growth in the human population in Vietnam and the decreased land holdings, shrinking agricultural land and increasing demand for food are some of the serious issues faced by the country. In addition, the increase in incomes and the government's policy to increase consumption of meat, eggs and milk, have boosted the demand for such products (Mulyono, 1998). According to Ishagi et al. (2002) rapid urbanization increases market demand for livestock products.

Other researchers also found that urban and peri-urban agriculture and livestock keeping was primarily part of a survival strategy among the low-income bracket, but also contributed to the income of the middle class, it was also still critical to the food security of many urban households in many developing countries (DFID, 2002).

Most of the people in cities and peri-urban areas practice urban agriculture because it provides food for their families and for income generation and poverty alleviation. It is attractive because of proximity to the markets, for waste management and production of organic fertilizer (i.e. people take manure from the cattle barn or poultry house in the town and send it to their farm in the rural area) and as a means of converting by-products, which are often readily available and inexpensive in urban areas (e.g. brewers spent grain, bran, seek cakes, low-quality roughage), into high-quality proteins/food (milk, meat and eggs) (FAO, 2001).

Livestock rearing also provides a meaningful occupation throughout the year, both full-time and part-time at the location itself, and provides assured income and ensures better utilization of human resources. It provides employment, especially self-employment to a substantial proportion of the rural and urban population, many of whom are women, who generally play a major role in the care and management of livestock.

Livestock raising has often been part and parcel of urban agriculture, presenting its own specific problems and opportunities. Until recently, it was often regarded as problematic, backward and a sign of poverty. As with all branches of urban agriculture, however, livestock keeping now seems to be recognized for the positive role that it can play in urban living conditions across the world (FAO, 2001). Indeed livestock production has a variable and controversial, but often essential, role to play in and for cities. It occurs on a small scale, with both small and large animals (FAO, 2001).

Like other forms of urban agriculture, urban livestock production is widely debated today. Although animals can create problems such as odours, diseases and pollution, they can provide food with high protein content, jobs, or function as a source of income. They can also help to reduce the volume of organic waste and can be part of social networks that are only clear to those who are involved in them (FAO, 2001).

What are urban and peri-urban livestock systems?

FAO, 2001 defined urban and peri-urban livestock systems in many different ways and at many different levels in terms of population densities and histories, local stakeholders, animal species, etc: *"An urban livestock system is characterized by a large variation of livestock system that occur in and around densely populated areas and that strongly interact with the surrounding wealthy, as well as poor, human communities in different ways, at several levels of system-hierarchy and with nearby and distant rural areas"* and they also described descriptions and characteristics of urban livestock systems:

- Peri-urban producers have grazing land, located mainly on the outskirts of the town.
- The urban interface is characterized by strong urban influences; easy access to markets, services and other inputs, ready supplies of labour, but relative shortage of land and risk from population and urban growth.

## 2. Objectives

The objectives of this study were to survey the general livestock production in two urban areas of Angiang province, to identify the reciprocal influence between livestock production and people and the environment of the urban areas and to evaluate the effects of seasonal flooding and avian influenza on urban livestock production.

## 3. General discussion

### *3.1. History and development of urban livestock systems*

With the increasing of urbanization, peri-urban areas have grown which are often unplanned, un-serviced and extremely densely populated, poor people who have moved from rural areas in search of opportunities to improve their standard of living often populate them. Although people living in peri-urban areas may have insufficient nourishment some of them have retained rural skills which could be adapted to the peri-urban environment to provide food for local and other urban markets, Agricultural activity in peri-urban areas is linked to the nature of the market for the produce, potential for land use and supply of labour and services

FAO, 2001 suggested that when thinking in terms of future developments in opportunities for urban livestock, distinction can also be made between cities that have grown in blanket form and cities that were planned according to the concept of satellite towns. The possibilities for urban livestock should be distinguished according to a classification of cities into categories such as growing but diverse megalopolises.

### *3.2. Factors favoring urban livestock keeping*

#### 3.2.1. Food security

Animal use products that are leftover by man, for example kitchen waste, hotel leftovers, grass from roadsides and empty plots, residues from agro-industry etc…, and crop residues. The animal gives multiple products in return, such as meat, eggs, milk, income, fibers, etc. (FAO, 2001).

Many authors have asserted that urban livestock keeping provides the protein needs of urban populations, meet the specialized food requirements of city dwellers and contribute to the national food security assessed the nature and extent of food consumption and nutrition problems in urban areas of low-income countries and concluded that enhanced service provision of the urban poor is a crucial requirement to improved wellbeing.

#### 3.2.2. Employment

As in urban agriculture generally, urban livestock keeping is not only practiced by the poor. Different reasons to engage in urban livestock keeping (FAO, 2001) include the provision of a safety net for vulnerable groups such as retied people and women without formal employment opportunities, which is also important (DFID, 2002). Thus, livestock producing can be used to solve unemployment of a family member, variations in cash income from diverse other sources, enabling them to secure a proportion of family food security, enabling families to withstand declining real wages, particularly as a personal strategy of women,

#### 3.2.3. Feed resources

*Pig feeds.* Food waste (table and kitchen scraps) from restaurants and catering facilities of various institutions (e.g. schools, hospitals, companies, etc) can be collected, transported and processed into liquid or dry meal for feeding pigs (FAO, 2001). The waste from food processing also could be used to feed pigs, such as soybean waste, cassava pulp, brewer's grains etc. Products of sugar cane (juice, various types of molasses, cachaza), oil palm (whole fruits, oil,

fiber press by-product, fatty acids, etc) and cassava (chips) can be used to provide part or all the energy in the diet. All of these can be mixed with other ingredients to meet the nutrient requirements of different classes of pig (Sánchez, 1998). However often, although animal performance is low, the feed cost is also low, and overall profitability can be acceptable (Xuan *et al*, 1995). However, commercial feeds are usually readily available in urban and peri-urban areas, although the cost is usually high.

*Poultry feeds.* The historical feed base for poultry in the villages has been scavenged feeds, which in many cases only poultry can harvest (e.g. worms, insects, etc.). Often these are complemented by kitchen wastes, crop by-products and spare grains. Industrial crops can also provide products and by-products that can be utilized in poultry diets, replacing traditional ingredients. However, the anatomical nature of chickens and hens, and current building and crate designs do not facilitate the inclusion of a variety of feedstuffs that cannot be dried and milled (Sánchez, 1998).

*Large ruminant feeds.* Vietnam can be divided into five physic-graphical zones: coastal, plains, undulating midlands, low mountains, and high mountains (Xuan et al, 1995). In each zone, cattle and buffalo owners use locally available feeds for their ruminants, such as grass (natural and cultivated), rice-straw, maize, cassava, and other by-products. However, the main feed for cattle and buffalo is grasses (Thanh, 2001); cattle and buffalo can be grazed or grasses can be cut on the field, roadsides, riverbanks or fallow land and carried home. Rice straw, of which over 25 millions ton per year are produced (Ly, 2003) is also stored and fed to ruminants at any time of the year.

*Small ruminant feeds.* Ngu (2001), when carrying out a study in the urban and peri-urban areas in Cantho City, found that goats were fed available by-products from crop production or green materials, which were produced within the household or natural grasses and leaves. Goats were also fed by-products from the market, such as cabbage, cauliflower and carrots, or peels and waste from fruits, such as pineapple, jackfruit and banana flower. Using these waste materials not only increased profits for producers but also benefited the environment.

*Small animal feeds.* At family level, small animals (rabbits, guinea pigs, snails etc) can be fed with home and market vegetable residues (Sánchez, 1998).

#### 3.2.4. Other factors

Other factors that affect the tendency for urban livestock systems to emerge include the availability of specialized services such as: veterinarians; processing industries; the need for short distances between producers and consumers for commodities such as fresh milk and hot meat, less need of packaging, storage and transportation of meat, eggs, and milk; waste recycling and re-use possibilities, and the fact that urban consumers use more animals products than rural consumers (FAO, 2001).

### *3.3. Species and animal types*

There is no clear trend in terms of the livestock species kept in the different cities in the developing world (DFID, 2002). In Vietnam, the pig is the dominant livestock species, with numerous herds, ranging from one or two pigs kept in the backyard to industrial-scale production. Pork accounts for almost 75% of the animal products consumed in Vietnam (Ly, 2002), followed by chicken, duck, cattle and buffalo meat.

### *3.4. Problems in urban livestock systems*

Although diversity is a main characteristic of traditional livestock production and a wide array of feed resources is being used, such as pastures in marginal lands, crop residues, agro-industrial by-products and waste from households, etc. the traditional feed resource base is still limited and livestock production can not expand at the same pace as the rapidly increasing demand for livestock products (Steinfeld et al., 1996).

Steinfeld et al (1996) also asserted that "all these pressures on the environment are the result of a process of change in which the rising demand for livestock commodities is creating a new role not only for livestock but also for the environment" and "the conflict between livestock and the environment is a conflict between different human needs and expectations".

*3.4.1. The environmental challenges*

According to Steinfeld et al. (1996), the balance between human needs and natural resource requirements will depend on what we do with animal production. They also warned that large land areas have become degraded over the last 35 years and that water resources have fallen to dangerously low levels or become unsafe to drink. Also, global temperatures have risen by about $0.5^0$ Celsius since the beginning of the industrial revolution in the nineteenth century, biodiversity is affected indirectly through concentrate feed requirements and the resulting intensification and expansion of crop agriculture. Related environmental effects may be disguised because livestock production and feed production are geographically separated and only linked through international trade. Furthermore, livestock and livestock waste emit important quantities of greenhouse gases such as methane, carbon dioxide and nitrous oxide, contributing to the phenomenon of global warming (Steinfeld *et al*, 1996; Thien, 2004).

*3.4.2. Animal wastes*

According to Sánchez (1998), in order to prevent negative ecological impacts animal waste must be treated and disposed off locally in a proper way. Generally animal waste is composed of three fractions: water, organic matter and inorganic matter (minerals), of which, water does not cause any pollution but is the vehicle for the two other fractions. Animals waste contains carbon compounds (carbon dioxide $CO_2$, and methane $CH_4$), and ammonia (that is abundant in manure and can be converted to $NH_3$, nitrous oxide) (Bos and De Wit, 1996) which affects ecosystems because it is toxic, eutrophic and acidifying and harmful to the environment by contributing to global warming and the breakdown of the ozone layer (Steinfeld et al., 1996). They also found that inorganic matter including copper, zinc and cadmium which are generally bound to the soil but can build up to toxic levels with continued overloading over a long period.

Sánchez (1998) showed that poultry manure is not only considered a problem but also can be a feed ingredient or fertilizer depending on the local legislation; cattle manure only becomes a problem when rearing large numbers of animals on small areas far from cropping areas. However pig manure is seen as the main polluter of surface and ground water sources. The problem from animal production is different between inner-urban areas and peri-urban areas; it is worse in the inner-urban areas where the proximity between people and livestock is closer and the possibility to use manure for crop production is much more limited than in the peri-urban areas where the manure is frequently used on crops or sold to farming neighbours (DFID, 2002).

*3.5. Characteristics of social economy and livestock production in Angiang province*

*Figure1. Angiang's administration map*

3.5.1. Characteristic of social economy in Angiang province

In 2003, the population of Angiang province reached 2,152,736 inhabitants, of which 1,093,335 were women, accounting thus for just over 50% of the total population of the province; 1,627,875 inhabitants (75.6%) lived in rural areas. Although the population in rural areas was higher than in urban areas, the trend is toward gradually decreasing rural populations and increasing populations in the urban areas. Population density in Angiang Province was 632 persons/$km^2$ and differed from district to district. For example Long Xuyen has the highest population density (2,485 persons/$km^2$), followed by Chau Doc town (1,115 persons/$km^2$) while the density in Tri Ton was the lowest (198 persons/$km^2$).

Angiang is a province with a young population and with 1,285,646 of working age (59.7% of the total population). However, the education level of the working population is still low (Angiang people Committee, 2003). A census in 1999 showed that 15% of the total population (> 5 years old) in the province was illiterate, 56.3% had primary school education, 11.6% secondary school education and only 12.6% had a high school education.

The economy of Angiang province depends heavily on agriculture, and so the proportion working in agriculture (Sector 1) was highest, accounting for more than 73% of the total working population, although the trend has been downward in recent years. The reason is that agricultural workers, especially the young, prefer to work in industry in order to get more income. The proportion working in trade and services (Sector 3) was about 20% of the total, and in industry and construction (Sector 2) only 7%.

Table 1.1. Proportion of workers in different economic sectors in Angiang province (2002-2003)

| Economic sector | 2002 | | 2003 | |
|---|---|---|---|---|
| | Workers | % | Workers | % |
| Total | 1 024 307 | 100.0 | 1 018 797 | 100,0 |
| (Agriculture, Forestry and Fishing) | 752 321 | 73.4 | 744 138 | 73.0 |
| Sector 2 (Industry and Construction) | 75 682 | 7.4 | 74 859 | 7.3 |
| Sector 3 (Trade and Services) | 196 304 | 19.2 | 199 800 | 19.6 |

Source: Angiang Statistical Yearbook, 2003

The revenue from Sector 1 (Agriculture, Forestry and Fishing) was highest, but is tending to decrease (in 1996 the revenue from Sector 1 accounted for 37.2% of the total, but in 2003 had

declined to 26%, while the trend in the revenue from salaried workers was increasing (from 22% in 1996 to 25% in 2003). The revenue from other sources also varied.

3.5.2. Livestock production in Angiang province

*Integration of crop and livestock production*. Like in other parts of Vietnam, farmers in Angiang Province raise livestock commercially and for subsistence. Small-scale farmers produce rice mostly for home consumption; any surplus is sold to middlemen. By products, such as rice bran and broken rice are used to feed pigs, chickens or ducks. Duck also scavenge in the fields after harvesting the rice, which helps to reduce the feed costs. Rice straw or crop by-products (maize stems) are stored to feed to cattle and buffaloes when there is a lack of natural grasses (in the dry and flood season). Farmers keep livestock to supply food (meat, eggs), use draft power for transportation or land preparation for crops, use the manure as a fertilizer for crops, and as a way of earning income form the sale of draft power, manure, and feathers from ducks.

Table 1.2. Sources of revenue in Angiang Province (1996-2003)

| Source of revenue | 1996 | | 2000 | | 2003 | |
|---|---|---|---|---|---|---|
| | Value 1000 VND | % | Value 1000 VND | % | Value 1000 VND | % |
| Total | 256.8 | 100.0 | 365.0 | 100.0 | 441.0 | 100.0 |
| Salary | 56.6 | 22.0 | 74.2 | 20.3 | 111.0 | 25.2 |
| Sector 1 | 95.5 | 37.2 | 140.5 | 38.5 | 114.8 | 26.0 |
| Sector 2 | 21.4 | 8.3 | 29.3 | 8.0 | 35.4 | 7.5 |
| Sector 3 | 61.9 | 24.1 | 91.7 | 25.1 | 88.7 | 21.2 |
| Others | 21.4 | 8.3 | 29.4 | 8.0 | 88.7 | 20.1 |

*Source: Angiang Statistical Yearbook, 2003*

*Livestock species*. Livestock species distribution depended on the area and the traditions and customs of livestock keepers. Cattle are concentrated in Tri Ton and Tinh Bien districts (34.9% and 29.9% of the total cattle herd in the province, respectively) where the land is mainly hilly and the Khmer people traditionally keep cattle. Buffalo are concentrated in An Phu district (29.2% of the total buffalo in the province). This could be because An Phu is flooded every year, so using draft power from buffalo to prepare the land is easier than using machines. Pigs are distributed throughout the province, but with the highest numbers in Phu Tan (21%) and Thoai Son (16%). Most of the goats are found in Tan Chau district, where for the Cham people keeping goats is a tradition. Chickens and ducks are found in every part of the province, and the numbers are unstable, varying between and within years. Normally, chickens are allowed to scavenge in the backyards and ducks in the fields.

Besides traditional livestock species, such as pigs, chickens, duck, cattle and buffalo, in recent years, other species in Angiang have been introduced and are increasing such as goats, sheep, rabbits and crocodiles. Goats are becoming a popular species of the Cham people and numbers are increasing, although the market for goat, sheep and rabbit meat is limited to restaurants.

Table 1.3. Number of livestock species (by district) in Angiang province in 2003

| District | Number of livestock species | | | | | |
|---|---|---|---|---|---|---|
| | Cattle | | Buffalo | | Pigs* | |
| | Head | % | Head | % | Head | % |
| Long Xuyen City | 1,220 | 2.3 | 60 | 1.6 | 14,777 | 7.3 |
| Chau Doc Town | 578 | 1.1 | 143 | 3.8 | 5,788 | 2.8 |
| An Phu | 1,095 | 2.1 | 1,088 | 29.2 | 12,484 | 6.1 |
| Tan Chau | 1,586 | 3.0 | 397 | 10.6 | 10,851 | 5.3 |
| Phu Tan | 932 | 1.8 | 443 | 11.9 | 43,611 | 21.4 |
| Chau Phu | 2,609 | 4.9 | 120 | 3.2 | 17,448 | 8.6 |
| Tinh Bien | 15,815 | 29.9 | 512 | 13.7 | 10,467 | 5.1 |
| Tri Ton | 18,432 | 34.9 | 578 | 15.5 | 11,538 | 5.7 |
| Cho Moi | 6,899 | 13.1 | 85 | 2.3 | 26,532 | 13.0 |
| Chau Thanh | 2,118 | 4.0 | 166 | 4.5 | 17,725 | 8.7 |
| Thoai Son | 1,548 | 2.9 | 136 | 3.6 | 32,530 | 16.0 |
| Total | 52, 832 | 100.0 | 3,728 | 100.0 | 203,751 | 100.0 |

*Source: Angiang Statistic Yearbook, 2003*
**Pigs over two months of age*

Following the outbreaks of avian influenza, the Provincial government had to destroy many poultry flocks, which reduced the production of poultry meat and eggs. Because of the perceived dangers to their health, people have reduced or their consumption of chicken and duck products and instead consume more pork and fish. This has encouraged farmers keep more pigs in most of the districts in Angiang. For example Phu Tan district the number of pigs has increased by nearly 15,000, in An Phu by 8,000, in Chau Phu 5,000 and in Tri Ton and Cho Moi by 4,000 pigs. Although the feed costs fluctuate producers still attain a profit of about 300,000 VND per pig after deducting expenses (breed, feed, veterinary costs etc.) or 500,000 VND if they produce the piglets themselves (Angiang government, 2004). This has encouraged farmer to increase the number of pigs in their herd. In 2004, the number of farmers that produced only 1-3 pigs was nearly 46% of the total, which was 7.5% less if compared with 2003, but farms with 4 or more than 4 pigs increased to 29%. The structure of the pig herds also changed in 2004, with sows accounting for 15.5%, and fattening pigs 83.3% of the total, while the corresponding proportions were 14.8% and 85%, respectively, in 2003.

Buffalo and cattle numbers also increased by around 10,000 head, of which 9,000 were cattle, mostly in Tinh Bien and Tri Ton district where keeping cattle is a traditional profession and the cattle-race festival is organized every year (Luc, 1999). Because feed for cattle is easy to find and the keeper can improve their income by using leisured labour (Anh, V.T., 2004), the number of cattle is also increasing in other districts, such as Cho Moi, Chau Thanh and Tan Chau (Angiang government, 2004).

*Feeding systems.* Feeding systems for livestock in Angiang Province vary, depending on factors such as animal species, household income, household activities and area. There is an important difference between ruminants such as cows, buffaloes, goats and sheep, which mainly eat feeds rich in fiber (grasses, hay, rice-straw, maize stems, and agricultural by-products) and monogastrics, such as chickens, ducks and pigs, which mainly are given feeds rich in energy (rice, broken rice, rice bran, processing residues, or kitchen waste). Wealthy producers are able to purchase high quality concentrates for their pigs and poultry and buy as much feed as they need, while poor producers are forced to utilize what they have. Although they lack money to buy as commercial feeds but they have available labour to collect feed for their livestock.

In addition, some producers who keep cows, draft cattle and buffalo, and sometimes even goats, also use rice bran to supplement their animals, particularly in Tri Ton and Tinh Bien districts, where the quality of the natural grasses is not so good. Farmers in this area are also accustomed to providing premixes and mineral blocks for their cattle (Hong, et al., 2001)

*Rearing systems.* In general, livestock production systems in Angiang Province are mostly traditional. Farmers keep livestock to meet their immediate needs such as for consumption (for instance chickens and ducks, and sometimes pigs are slaughtered on the anniversary of the death of a relative; pigs, cattle and buffalo are slaughtered at weddings and funerals), and cattle and buffalo are used for draft power. This means that livestock farmers do not usually have any long-tem strategy for their production. Sanh et al. (1998) showed in a survey of the management practices of crops and animals and their interactions in the Mekong Delta that backyard farms were predominant with 82% keeping pigs, 15% chickens and a few ducks.

Like other province in the Mekong Delta, there are three major types of livestock production system in Angiang Province: semi-industrial or industrial farms, medium size commercial farms, and small scale or backyard farms (Duong *et al.*, 2002). According to the kind of livestock species kept, producers would use different rearing systems. Mostly, pigs are kept in confinement systems; chickens and ducks are allowed to scavenge (in back-gardens or fields) and buffalo, cattle and goat are kept in combined systems. Normally, chickens and ducks scavenge throughout the day, while cattle and buffalo are grazed from 5-6 hours/day (from 10.00-11.00h to 16.00-17.00h) (Hong et al., 2001). Confinement systems for cattle mean that cattle are confined in a stall all of the time and the farmer needs to cut, store and supply feed and water. Feed supply depends on the capacity of the owners, and it may be necessary to train them to utilize by-products efficiently to ensure that they have enough feed for their cattle (Hong et al, 2001)

*Factors affecting livestock production in Angiang province.* Several factors affect livestock production in Angiang Province, such as the economic status of the livestock producers (resource-poor farmers do not have the capital to invest in improving or expanding production, and their systems are characterized by small herd size, low quality feed, sale before optimum slaughter age etc…), markets (low or unstable prices, dishonest middlemen), limited feed resources (feed may not be available or be too expensive, or of poor quality), availability of veterinary services, availability of improved breeds and neighbourhood factors. Of these, feed resources and markets were the two most important factors that affected livestock production, and these determined producer benefits and strategy. For example, if the cost of feed became too high relative to the price of livestock products (HTH, 2004) farmers would have no incentive to continue or to expand production. In addition, the number and type of livestock kept also depends on the market prices of inputs and outputs (Duong et al., 2002). For instance, the number of pigs produced is dependent on the price of rice bran. When rice production declines, rice bran availability in the markets is reduced, and the price increases. Pig producers often then cannot continue, and are forced to sell their pigs at almost any price, including piglets. They also sell pork at very low prices until the number of piglets is reduced to a level they can sustain. Later, rice bran often becomes more available or cheaper while the price of piglets increases (Xuan et al., 1995). This is an example of a typical economic cycle. In addition, when feed costs are extremely high, some pig producers decide to get out of pigs completely, and instead raise other species, particularly cattle. This reduces the capital required for feed but also attracts support from the government in terms of capital and support from the extension services.

The environment is also an important factor influencing animal production, especially in areas where the population is increased rapidly, as it is currently in many parts of Angiang Province. In order to protect the environment, the People's Committee of the Province has promulgated criteria for the delineation, management and production of livestock: for example, the animal house of small-scale producers must be at least 10 m from their residence; ducks are only allowed to scavenge in the fields after the rice harvest, and are not allowed to swim in rivers and canals; large scale animal units have to register with the local government; small scale

producers do not need to register but have to follow laws to protect the environment and prevent spread of diseases.

*Support.* Several breed improvement programs have been introduced and supported by the Government of Angiang Province between 2000-2003 (Hoa, 2004), for example:

- Applied research is supported by grants - two for cattle, two for pigs and three for poultry.
- Investment for upgrading of breeding farms (especially, cattle breeding in Luong An Tra, Tri Ton district, and pig breeding in Vinh Khanh, Thoai Son)

The development of animal production has been encouraged by giving priority to policies such as the policy for producing improved breeds in the province, and for developing cattle herds.

There have been a number of training courses held between 2001-2003 for extension workers and farmers supported by the central Government and the provincial budget, on for example:

- Training and transferring artificial insemination techniques for pigs and cattle
- Training in techniques for dairy and beef cattle production, improvements in pig meat quality (lean meat), and commercial poultry production
- Organizing workshops, training and interpreting techniques for better use of by-products, including processing for cattle feed, production of mineral blocks, and growing high quality grass.
- Managing crossbreeding programmes between local cattle and Red Sindhi

## 4. Conclusion

Urban livestock keeping provides food with high protein content and jobs and income for human population, especially retired people and women without formal employment opportunities, and poor people. However, it also can effect on the environment through odours, diseases, pollution and environment changes. As a result urban livestock production is widely debated today.

The economy of Angiang province depends heavily on agriculture and the proportion working in agriculture was highest. In resent years, together with the urbanization, production activities in Angiang have also changed, both in urban and rural areas. However, livestock production in urban areas still plays an important role in providing employment and protein for the people. The main factors that will influence future trends in livestock production are the continuing urbanization and occurrence of avian influenza.

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