

households keeping them and in actual numbers. The presence of cattle, sheep and goats was strongly correlated with owners who were Muslim. Sheep, and goats in particular, are required for various Muslim festivals and this explains their relatively high number amongst the Muslim community.

Surprisingly this survey did not find evidence of urban-rural linkages. Respondents mentioned little or no inflow of food or animals from rural areas and no outflow of manure to even peri-urban farmers. However, the encouragement of such links e.g. providing peri-urban market sites could be beneficial for all concerned.

'Trespassing', the uncontrolled movement of animals into other people's houses was the main cause of conflict between livestock and non-livestock owners.

The Kumasi Metropolitan Assembly does not object to chickens but does object to free roaming larger animals such as sheep, goats and cattle. Some owners of large livestock reported harassment by the authorities, who were trying to relocate their animals outside the city area. Although the authorities claimed that they would impound large animals found wandering in the streets the authors believe that such an act would lead to significant civil unrest in the survey areas.

Urban livestock farming in Kumasi is a community-tolerated phenomenon. Rules and regulations relating to livestock will only work with community acceptance and if this is not present then people will do whatever is necessary to try to secure their livelihoods.

It is difficult to imagine that the Ghana government or the Kumasi Authority will ever see the promotion and support of improved urban livestock keeping as a high enough priority to justify financial investment. Any changes that do occur are likely to result from changes in the overall level of poverty and availability of alternative employment opportunities. If people secure employment and become less poor then livestock keeping will tend to reduce as a result of community pressure from non-livestock keepers. If poverty increases for whatever reason then urban livestock keeping is likely to continue and even increase.

Urban pig farming

in irregular settlements in Uruguay

At the end of the 19th century, Sansón Carrasco (nom de plume of Daniel Muñoz, 1849-1930), reported on pigs being bred with household wastes. His chronicles are still valid today. For instance, in his article "Trash" (1883), he writes "...and in the depressions, and on the beach, pigs and more pigs, and always pigs everywhere you look, some of them feeding, some stretched out without a care in the world, others grunting as they get a glimpse of me, as if upset by my intrusion in their domain...".

One of the survival strategies developed by the residents of urban settlements in the department of Montevideo, is the collection and sorting of household solid waste (organic and

breeders constitute a distinct group. This explains the high incidence of health problems (transmission of diseases from animals to people) and environmental impacts (people living next to pigsties, inadequate final disposal of waste, food preparing systems) that are worse in the case of pig farming in urban and peri-urban areas. Due to several factors, including the socio-economic conditions of breeders and the urban status of the neighbourhoods where the practice is carried out, pig farming in urban areas is one of the most remarkable aspects of Urban Agriculture developed in our country.

Pig raising in the peripheral areas of the city of Montevideo is significant

inorganic). While inorganic waste is sorted and sold to the local recycling industry, organic waste is used in most cases as animal feed (mainly for pigs). Among urban solid waste sorters, pig

PIG RAISING IN THE DEPARTMENT OF MONTEVIDEO

Pig raising is a widespread practice in the Department of Montevideo. The importance of pig farming in the peripheral areas of the city of Montevideo has increased consistently partic-

Livestock at dumpsite in Nakuru, Kenya



Photo by D. Foeken

Alain Santandreu, ✉ santandreu@verdeamerica.zzn.com
Gustavo Castro, ✉ gucasro@usa.net
Fernando Ronca, ✉ umr@piso3.imm.gub.uy
Veterinary Faculty, University of Montevideo

ularly since 1970 (Moreira, 1997). There are two types of pig farming: in the rural areas, both allowed and regulated by the Municipal Intendency of Montevideo (-IMM) and in the urban areas, carried out in settlements and not controlled by the municipality. Both types are clearly differentiated and have distinctive features.

Ninety percent of plots dedicated to pig farming in rural areas are managed by small farmers. The largest environmental impacts caused by raising pigs in the rural environments are the final disposal of liquid and solid effluents typical of the practice, and to a lesser degree the final disposal of solid inorganic, non-saleable waste gathered during food sorting (Barlocco et al., 1998).

In urban areas, pig farming is mainly concentrated in the so-called slums or *cantegriles*, which are located in marginal areas, and are characterised by sub-standard housing and the lack of urban services. Here the sorters-breeders and their families carry out their activities. In this sense pig raising in urban areas is a peculiar type of urban agriculture, although similarities are shared such as socio-economic circumstances (poverty) and dependency of intermediaries.

THE SORTERS OF URBAN SOLID WASTES

Marginal neighbourhoods are a growing phenomenon in Latin America. Known by many different names in Spanish (tugurios, villas miserias, favelas, callampas, pueblos jóvenes or cantegriles), these urban settlements are located on the

periphery of cities and concentrate large contingents of labour that the productive system cannot absorb.

By definition, the marginal neighbourhoods include a large variety of human situations concerning origin, land tenure, infrastructure, quality of housing and population density. According to data from the Ministry of Housing, Territorial Management and the Environment, towards the end of 1995 there were 111 irregular settlements in the Department of Montevideo, with a total of 53,803 residents. The background of the residents of these settlements has shifted. In the 1950s, 65% were of rural origin, while by the 1980s 76% of the residents were born in Montevideo.

In the city of Montevideo, sorters live in slums and squatter settlements. Although the term "settlement" is used in many cases as a synonym for slum, each term refers to a different urban phenomenon. The slow and fairly logical growth of slums differs from the spontaneous and explosive emergence of squatter settlements. Particularly dramatic is the speed

Pig farming implies a significant reuse of household solid waste as feed

at which the phenomenon of squatter settlements is growing, shifting towards the metropolitan area and other secondary cities, the result of a strategy of large segments of the population for securing a place to live.

As the inhabitants of these settlements have problems finding jobs, many develop other strategies for family survival. The most widespread is the collection and sorting of household solid waste. Many sorters divide their time between animal husbandry activities and performing other occupations, as street vendors or in the construction sector. Sorting is an economic activity based on the collection of household solid waste (organic and inorganic) which is then sorted and sold to the local recycling industry.

Typically, the sorting is performed by several members of the family who scour the city's middle- and upper-class neighbourhoods, gathering household solid wastes in hand- or horse-drawn carts. If the sorters do not raise pigs, organic

waste is used to feed the horses, or discarded along the river banks or public roads, while inorganic waste is sold as raw material to the local recycling industry (mainly paper, cardboard and metal).

SORTERS-BREEDERS

Within the group of sorters of urban solid waste, pig breeders represent a group with distinctive characteristics. Many of the more than 2,900 sorters raise pigs in urban areas to supplement their household income. Sorting household solid waste is the main activity for the sorters-breeders (50% considered sorting the main source of income), while pig raising is a supplementary activity. Studies show that only 8% of surveyed sorters consider pig raising as their only source of income, others being fruit markets (18%) and construction work and pensions (both 8%). For most sorters-breeders, animals fill the role of a "piggy-bank", to which they can have access in order to cope with unforeseen expenses (Vitale et al., 1996; Moreira, 1997; Tommasino et al., 1998).

The development of this activity is strongly linked with strategies aimed at lowering the costs charged by cold storage houses and pork butcheries. The process whereby a sorter becomes a breeder can be outlined as follows. Typically, a supplier provides a sorter with pigs to fatten up. By selling them the sorter earns extra income, and this motivates him to continue production; gradually, he becomes a sorter-breeder.

MAIN FEATURES OF THE PIG RAISING SYSTEM IN URBAN SQUATTER SETTLEMENTS

According Vitale et al. (1996) most sorters-breeders are small producers who are responsible for the full cycle. In this case, it is not only the actual breeding but also the selling of the pigs that supplements their household income. The term full cycle encompasses the process from birth to fattening prior to slaughtering. Sorters-breeders who perform this practice typically have 1 or 2 sows. On the other hand, raising refers to practice of raising the animal from its birth until it is weaned from the mother and sold to fatteners, slaughtered, or sold as suckling pigs. Finally, finishers or fatteners only fatten the animals until they are sold for slaughter (Vitale et al. 1996). In third-party production forms, "capitalists" (term used by sorters-breeders to

REFERENCES

- Anchieri, D., Rodríguez Palazzi, D., Tommasino, H., Vitale, E., Castro, G., Lozano, A. and López, C. 1998. *Treatment of household solid waste as pig feed in order to prevent possible zoonosis*. In: 2nd Congress of Zoonosis in Argentina, 1st Congress of Emerging Diseases in Argentina, and 1st Latin American Congress of Emerging Diseases. Buenos Aires, Argentina.
- Moreira, R. 1997. *Converting waste sorters into pig breeders*. Extension Area, Veterinary Faculty, University of the Republic, Uruguay.
- Ghirotti, M. 1999. *Making better use of animal resources in a rapidly urbanizing world: a professional challenge*. In: *Revista Mundial de Zootecnia*, FAO, n° 92.
- Rodríguez Palazzi, D. 1996. *Project for the development of the Pig Production Unit of the Veterinary Faculty*. University of the Republic, Uruguay.
- Vitale, E., Moreira, R., Castro, G. and Tommasino, H. 1996. *The hidden production. Problems faced by pig breeders in the slums of Montevideo*. Extension Area, Veterinary Faculty, University of the Republic. Edición Grupo Aportes-Emaús, Uruguay.
- Tommasino, H., Vitale, E., Moreira, R., Castro, G., Aguirre, E. and Lozano, A. 1998. *Situation analysis of pig raising in peripheral neighborhoods of the city of Montevideo*. Final report. Project financed by the Sectoral Scientific Research Commission, University of the Republic, Uruguay.



refer to intermediaries or suppliers) provide the pigs to be fattened. Typically the “capitalist” provides sorters–breeders with pigs weighing between 20 and 50 kg. As this is an illegal activity carried out by the low-income population in marginal areas, the suppliers often lend money or help the breeders in the event of health or other problems. This leads to an implicit relationship of fidelity that may hinder the regularisation of this practice.

After the pigs enter the squatter settlement, the entire process of raising and eventually slaughtering, processing and selling them takes place within the city. Pig farming in squatter settlements implies a significant reuse of household solid waste as feed, although commercial (bakery leftovers) and industrial waste (remnants of slaughtered animals from cold storage houses) are also used. Most settlement breeders buy their animals in the town of Canelones, or in the rural area around Montevideo.

The final product sold by the breeders depends on the productive cycle they develop. Thus, breeders sell suckling pigs (both alive and slaughtered) to intermediaries, to slaughterhouses, or directly to consumers. Fatteners sell fattened pigs (90–120 kg) to be slaughtered or slaughter them themselves. Those who perform the full cycle may sell both categories of animals. Thus, consumers (who may be people from the same settlement) have access to the various types of products (cured or fresh meat) from several sources.

HEALTH AND ENVIRONMENTAL PROBLEMS CAUSED BY PIG FARMING IN URBAN SETTLEMENTS

Pig farming in the city is a survival strategy developed with the efforts of the entire family, and performed in the place where they live. For this reason, transmission of diseases from animals to humans (see Table 1) and the environ-

mental impacts (houses located next to pigsties, inadequate final disposal of waste and food preparation systems) of this activity are significant.

Health problems are ranked among the primary concerns of those who work with sorters–pig breeders. Squatter settlements where pig farming is carried out are faced with problems such as overcrowding and lack of services (sewage and potable water). It should be remembered that pig farming still is a clandestine activity.

Health problems are ranked among the primary concerns

Most sorters–breeders gather both organic and inorganic waste. Ninety-two percent of sorters–breeders surveyed sell part of the inorganic waste collected and throw away refuse in areas located close to the settlements, on the banks of the streams and/or along public roads (Vitale et al., 1996). Organic waste, on the other hand, is composed by remnants of foods discarded by households and commercial establishments such as bakeries, supermarkets, restaurants, fish scraps, fruits and vegetables. According to a recent study, 96% of sorters–breeders do the sorting at home (Vitale et al., 1996).

Although the organic matter is perishable, 83% of urban pig breeders do not treat the food they feed their animals in any way, and only 28% add some type of food supplement, while the percentage of

sorters–breeders who store food is significant. If any form of treatment occurs it is usually cooking, using part of the waste that cannot be sold (e.g. car covers, plastic remains and wood to light fires) and causing high levels of environmental pollution. To make matters worse, as large amounts of food are involved, the temperature reached is not high enough to ensure uniform cooking, leaving part of the mass untreated. The transmission of diseases from animals to humans, for example trichinosis or cysticercosis, can occur when pigs are fed with untreated waste (Anchieri et al., 1998).

CONCLUSIONS

Pig farming in urban areas constitutes a significant practice developed within the city of Montevideo. Pig raising in urban areas is a family-type activity, involving children, youngsters and women in a permanent fashion. The role of women is highly relevant, both in sorting household waste and in taking care of the pigs. Although the practice is mainly a family activity, organised groups such as co-operatives are starting to develop and are worth considering.

Although no cost–benefit studies have been made, pig raising in squatter settlements allows households to generate supplementary income to cope with unforeseen expenses. However, the activity poses serious food safety and health problems, as many sorters–breeders share the food they collect with their pigs and raise them in their homes.

The activities of sorters–breeders generate significant adverse environmental impacts, both in the sorting of inorganic solid waste and organic solid waste. Food stored in unstable conditions can cause problems with rodents and insects; this is compounded by the urban characteristics of the squatter settlements where the activity is developed. These characteristics form a limitation to the possible benefits arising from the re-use of household solid waste as pig feed.

Table 1 – Main diseases that humans can catch from pig farming

Bacterial	Viral	Parasitic	Mycotic
<i>Anthrax (Carbuncle)</i>	<i>Vesicular stomatitis</i>	<i>Trichinosis</i>	<i>Dermatomycosis</i>
<i>Brucellosis</i>		<i>Cysticercosis</i>	
<i>Erysipelosis</i>		<i>Toxoplasmosis</i>	
<i>Leptospyrosis</i>		<i>Sarcotic scab</i>	
<i>Tuberculosis</i>			
<i>Salmonellosis</i>			
<i>Staphilococcia</i>			

Source: Prepared by Castro, G. (1999) based on Ghirotti, M. (1999).