Journal of Agriculture and Rural Development in the Tropics and Subtropics
Volume 105, No. 2, 2004, pages 165–173

Socio-economic and Technical Characteristics of Backyard Animal Husbandry in Two Rural Communities of Yucatan, Mexico

R. Santos Ricalde [*1], **C. E. Hau**[1], **R. Belmar Casso**[1], **I. Armendariz Yañez**[1], **R. Cetina Góngora**[1], **L. Sarmiento Franco**[1]and **J. Segura Correa**[1]

Abstract

This research work was conducted in order to asses the socio-economic and technical aspects of backyard animal rearing in two communities of Yucatán, México. One hundred and thirty nine families were interviewed in Sudzal (C_1) and 117 families in San Jose Tzal (C_2). A structured questionnaire was used to interview the families on technical and socio-economic aspects. Using this information the technical level of animal husbandry and a index of socio-economic status of the families involved in backyard animal rearing in both communities were determined. In C_1 46.8% of the interviewed families reared animals in their backyard in comparison to 70.9% in C_2. Main animal species kept in the backyard were chickens (C_1= 92.3% and C_2= 88.0), turkeys (C_1= 63.1% and C_2= 55.4%) and pigs (C_1= 38.5% and $1C_2$= 5.7% in C_1 and C_2 respectively). In C_2 100% of pigs kept in the backyard were of the commercial type. Technical level in animal production was significantly higher ($P < 0.0001$) in C_2 than in C_1, because utilisation of commercial diets was higher in C_2 ($P < 0.001$) than in C_1. The families of C_2 had a higher socio-economic level ($P < 0.002$) than families from C_1, because families of C_2 have houses built with lasting materials ($P < 0.0001$) and the occupation of the head of the family was associated with higher income (merchants or employees) ($P < 0.0001$).The correlation coefficients between socio-economic status and technical level in backyard animal production showed that 84% of the technical level was explained by the socio-economic status. It can be concluded that socio-economic status has a high influence on backyard animal production characteristics. The socio-economic status determine the number of animals kept and the technical level in animal rearing.

Keywords: backyard animal rearing, socio-economic status, technical level, Yucatan, Mexico

1 Introduction

Animal rearing is a common activity in backyards of rural communities of Mexico and other Latin-American countries (Flores *et al.*, 1988). This animal production system includes mainly chickens, turkeys and pigs, which are an important source of protein

* corresponding author, Ronald Santos Ricalde, email: rsantos@tunku.uady.mx.

[1] Departamento de Nutrición Animal, Facultad de Medicina Veterinaria y Zootecnia. Universidad Autónoma de Yucatán, Apartado postal 4-116 Itzimna, Mérida, Yucatán, México.

for the rural families. Some animal species such as pigs are seemed as "pig bank" (Berdugo and Franco, 1990). Animals are fed feedstuffs and by-products from the traditional agricultural system called "Milpa". In Yucatan, México the Milpa is a small agricultural system in which several plant species are cultivated simultaneously and in harmony with the environment. The products from agriculture are used to feed the family, but, any extra amount as well as the by-products are normally used to feed animals (Gongora *et al.*, 1986; Ortega *et al.*, 1993).

The backyard animal production has begun to undergo transformations due to the influence of external factors such as low availability of land for cropping; low productivity of the traditional agriculture system, which encourages people to migrate; and also because animal rearing is a low input-output system, which has no chance to compete with the industrialized systems (Rejón *et al.*, 1996; Rodríguez *et al.*, 1996).

Technical aspects of the backyard animal rearing of rural communities have been transformed also by external factors, such as introduction of commercial breeds of animals and the utilization of commercial diets that have begun to be used to feed animals (Rejón and Segura, 1997).

The objective of this research was to asses the socio-economic and technical aspects of backyard animal rearing in two communities of Yucatan, Mexico.

2 Materials and Methods

This research work was conducted in Sudzal and San Jose Tzal, two rural communities of Yucatan, Mexico. Sudzal is located in the eastern region of Yucatan, at 70 km from Merida, whereas San Jose Tzal is located in the southern area of Yucatan, at 20 km from Merida. Both communities were visited between May and July of 2002. The climate of the region is warm (average temperature ranging 21 to 33°C during the year). There is a rainy season between June and October, with an annual rainfall between 1000 and 1200mm (Duch, 1988).

The families included in this study were those agreeing to be interviewed. One hundred and thirty nine families were interviewed in Sudzal (C_1) and 117 families in San Jose Tzal (C_2). A structured questionnaire was used to interview the families regarding aspects of backyard animal rearing and their household.

Information about socio-economic aspects, backyard animal keeping and agriculture activities was obtained also from those families.

Information on animal species, breeds reared and feedstuff used to feeding animals was also obtained. The technical level of animal husbandry was estimated using information on type of feeders, species supplied shelters, utilisation of commercial diets and utilisation of commercial breeds of animals. The following formulae were used to estimate the technical level of backyard animal rearing.

$$TF = \frac{NAC}{NAB} * RV$$

$$TAB = \frac{NCB}{NAB} * RV$$

$$TFS = \frac{NF + NS}{NAB} * RV$$

$$TTL = TF + TAB + TFS$$

Where:
TTL = Total technical level.
TF = Technical feeding system level.
NAC = Number of animal species fed commercial diets.
TAB = Technical level in animal breed used.
NCB = Number of species from commercial breeds.
TFS = Technical level of use of feeders and shelters.
NF = Number of species supplied feeders.
NS = Number of species supplied shelter.
NAB = Number of animal species in the backyard.
RV = Relative value (AQUINO *et al.*, 2003).

Only two species were considered for those calculations (poultry and pigs). Poultry included chickens and turkeys because of similar management for those species.

The relative value assigned to each technical component was 0.56 for feeding system, 0.25 for animal species from commercial breeds used and 0.19 for feeders and shelters utilization. The relative values were assigned according to AQUINO *et al.* (2003), who reported that those values represent the importance given to the role of each component by the rural families.

Socio-economic features of the families involved in backyard animal rearing such as, occupation of the head of the family, years attending to school, household characteristics (i.e. building materials), and electrical and drinking water services in the household were recorded for evaluation.

A index of socio-economic status was calculated using the information recorded about the socio-economic aspects, according to the following formulae:

$$SEI = YAS + HC + S + LO$$

Where:
SEI = Socio-economic index
YAS = Years that the head of family attended to school
HC = Household characteristics
S = House services
LO = Labour occupation of the head of the family

The socio-economic components used to calculate the SEI had a similar specific weight in the formulae. The number of years that the head of the family (HF) attended to school was considered for YAS determination. The number of years that the HF attended to school ranged from zero when HF did not attend school to 17 when HF coursed six years of primary school, three years of secondary school, three years of preparatory school and five years of professional studies. HC was estimated considering the following classification: 1) rustic households built with non lasting materials such as palm leaves and wood; 2) semi rustic household built with a combination of non lasting materials and lasting materials; and 3) households built with lasting materials. Services such as electricity and drinking water were taken into account for S determination. A value of one was assigned to each house service. The maximum value was two when both services were present in the house or zero if none of the services were present.

The occupation of the head of the family was classified as: 1) agriculture worker mainly; 2) retired and 3) employee or merchant. In relation to agriculture activities, the families were asked about staple food species cultivated in the Milpa.

The data obtained were analysed as percentage and medians. Technical level and socio-economic characteristics in both communities were compared and analysed statistically using Krustal-Wallis test.

3 Results

In C_1 46.8% of the families interviewed reared animals in their backyard in comparison to 70.9% of the families in C_2. The main species kept in the backyard in both communities were chickens, turkeys and pigs. Similar proportion of families kept chickens (92.3% and 88.0% in C_1 and C_2, respectively) and turkeys (63.1% and 55.4% in C_1 and C_2, respectively) in both communities. However, a higher number of families kept pigs in C_1 than in C_2 (38.5% and 15.7%, respectively).

A similar number of chickens, turkeys and pigs were observed in both communities. However, the data showed that more animals are kept by family in C_2 than in C_1 (Table 1). Families in C_2 kept twice the number of turkeys and pigs in the backyard than families in C_1. A relevant observation was associated to the trend of families from C_2 to keep commercial breeds of pigs. In C_2 100% of pigs kept in the backyard were of the commercial type (Table 1).

Families in C_2 utilized a higher proportion of commercial diets to feed their animals (Table 2). In both communities the families tended to use more commercial diets to feed pigs. In C_2 100% of families used commercial diets to feed their pigs. The utilization of commercial diets to feed pigs in C_2 could be associated with the utilization of commercial breed of pigs. In contrast, a higher proportion of families in C_1 used wild plants Such as *Leucaena leucocephala* and *Brossimun alicastrum* mainly, and kitchen wastes to feed pigs than in C_2. In C_2 a higher proportion of families used "Tortilla" to feed poultry than families in C_1. Tortilla is a manufactured product made from maize devoted mainly for human consumption, bought in a tortilla supply store. On the other

Table 1: Number and distribution by species and breed of animals kept in the backyards of two communities in Yucatan, Mexico.

	Communities					
	Sudzal			*San Jose Tzal*		
	Chicken	*Turkey*	*Pig*	*Chicken*	*Turkey*	*Pig*
Total	865	305	118	828	320	98
Median/family	8	2	1.5	10	4	3
SD $\pm$	16.7	8.2	4.5	9.4	14.4	10.5
Breed						
Creole (%)	100.0	100.0	84.0	98.6	97.8	100.0
Commercial (%)	0.0	0.0	16.0	1.4	2.2	0.0

Table 2: Feedstuffs, feeders and shelters used to rear animals in the backyard of two communities in Yucatan, Mexico.

	Communities			
	Sudzal		*San Jose Tzal*	
	Poultry	*Pig*	*Poultry*	*Pig*
Maize (%)	70.0	76.0	53.4	0.0
Tortilla (%)	45.0	48.0	67.1	0.0
Local plants (%)	15.0	48.0	5.5	0.0
Kitchen waste (%)	15.0	60.0	8.2	0.0
Commercial diets (%)	30.0	76.0	74.0	100.0
Supply of:				
Feeder	35.0	68.0	26.0	100.0
Shelter	43.3	60.0	31.5	100.0

hand, a higher proportion of families in C_1 used maize instead of tortilla and commercial diets to feed their animals, in comparison to families in C_2.

A larger proportion of families used wild plants, kitchen wastes and commercial diets to feed pigs than poultry in C_1 (Table 2). Also, in both communities, a higher proportion of families use feeders and shelters to rear pigs than poultry. These observations could be associated to the use of pigs as "pig banks". The families would care more for pigs and give them feedstuffs with a higher nutritional value, than poultry, because households can convert pigs into money when cash is needed for any family emergency.

Technical level in animal production was significantly higher ($P < 0.0001$) in C_2 than in C_1, because utilisation of commercial diets was higher in C_2 ($P < 0.001$) than in C_1 (Table 3).

Table 3: Technical level in different aspects related to backyard animal production in two communities of Yucatan, Mexico.

Use of	*Communities*		*SE*	*Probability Level*
	Sudzal	*San Jose Tzal*		
Commercial diets	0.0	0.45	0.05	$P < 0.0001$
Commercial breeds	0.0	0.0	0.14	$P < 0.06$
Shelter and feeders	0.15	0.15	0.26	$P < 0.09$
Total	0.23	0.45	0.32	$P < 0.001$

The correlation coefficients between the socio-economic index and the technical level in backyard animal production showed that 84% of the technical level was explained by the socio-economic index (Table 4). Also, that table shows that utilisation of commercial breeds was closely associated with utilisation of commercial diets, feeders and shelters.

The families of C_2 had a higher index of socio-economic status ($P < 0.002$) than families from C_1 (Table 5). This is because families of C_2 have houses built with lasting materials ($P < 0.0001$) and the occupation of the head of the family was associated with higher income (merchants or employee) ($P < 0.0001$).

A significantly higher proportion of families make Milpa in C_1 ($P < 0.0001$) in comparison to C_2 (Table 5). This result was also associated with type of occupation by the head of the family. In C_2 86% of the head of the families were merchants or employees, while in C_1 50% of the head of the families worked in their own Milpas (small scale farmers).

The main crops cultivated in the Milpa were: Maize (95.3% and 88.9% for C_1 and C_2, respectively), squash (53.5% and 50% for C_1 and C_2, respectively), local species of beans such as *Vigna unguiculata* and *Phasiolus vulgaris* (41.9% and 27.8% for C_1 and C_2, respectively) and other crops such as melon, watermelon, cassava and cucumber (20.9% and 16.7% for C_1 and C_2, respectively).

4 Discussion

The lower proportion of families that rear animals in C_1 in comparison to C_2 could be associated with a better socio-economic status of the families in C_2. Socio-economic status of families played also an important role on the number of animals kept in the backyard. As a result, a higher proportion of turkeys and pigs were kept in the backyards of C_2 as compared to C_1. Major availability of economic resources allowed keeping more animals and using commercial diets. According to Rejón and Segura (1997) rearing turkeys and pigs in Yucatan has been associated with utilization of commercial diets.

Table 4: Correlation coefficients of socio-economic and technical variables obtained in two communities of Yucatan.

	TTL	*SEL*	*TF*	*TFS*	*TAB*
TTL	1.0000	0.8395	0.0101	0.0080	0.0134
SEI	0.8395	1.0000	- 0.0118	- 0.0104	- 0.0133
TF	0.0101	- 0.0118	1.0000	1.0000	0.9998
TFS	0.0080	- 0.0104	1.0000	1.000	0.9997
TB	0.0134	- 0.0133	0.9998	0.9997	1.0000

TTL= Total technical level
SEI= Socio-economic indexl
TF= Technical level in the feeding system
TFS= Technical level in the use of feeders and shelters
TB= Technical level in animal breeds used

Table 5: Socio-economic characteristics of families surveyed in two communities of Yucatan, Mexico.

Item (Median)	*Communities*		*SE*	*Probability Level*
	Sudzal	*San Jose Tzal*		
Head of the family features				
Years attending to school	3	6	3.37	$P > 0.05$
Labour occupation*	2	3	8.84	$P < 0.0001$
Household characteristics				
Household built materials†	2	3	0.71	$P < 0.0001$
Household Services‡	2	2	0.18	$P > 0.05$
Socio-economic index	11	12	3.78	$P < 0.002$

* Rural farmer = 1; Retired = 2; Employee or Merchant = 3
† Lasting materials = 1; Combination of lasting and no lasting materials = 2; No lasting materials = 3
‡ Electricity or potable water = 1; Both, electricity and potable water = 2

The preference to rear chickens in both communities agrees with observations made in other studies (Berdugo, 1987; Barredo *et al.*, 1991; Aquino *et al.*, 2003). According to these authors the rural families prefer to keep chickens in the backyard because of their lower maintenance cost and because they are easer to rear in comparison to pigs.

The higher index of socio-economic status of the families in C_2 as opposed to the families of C_1 is well justified by the proximity to Merida, the capital city of Yucatan. A higher proportion of people from C_2 work in Merida as employee or merchants. Those people are commuters who going to work in Merida.

The results obtained in the correlation analysis showed that a higher index of socio-economic status was related to a higher technical level in animal management in the backyard. This higher technical level was associated with utilisation of commercial diets and commercial animal breeds. These results agree with findings reported for other animal production systems; as the socio-economic status of the farmer increase so does the technical level of the animal production system (Nuncio *et al.*, 2001).

The results obtained in this study showed that as the animals tended to become from Creole breeds the families tended to use more locally available resources such as products from the milpa, local plants and kitchen wastes. Inversely, as the animals came from commercial breeds the families tended to use commercial diets for feeding proposes. This effect was observed mainly in pig rearing.

The correlation analysis showed also, a narrow relationship between animal species and utilisation of commercial diets, feeders and shelters. As mentioned earlier the families prefer to invest economic resources to rear pigs because such animals can be sold when cash is needed (Richards and Leyva, 1985). In C_2 where particularly rearing of commercial breeds of pigs, is an additional activity carried out to allow an extra income.

Utilisation of maize and wild plants instead of tortillas and commercial diets to feed the animals in C_1 could be related to a major number of families involved in agricultural activities and the lower availability of economic resources. Conversely, in C_2 the lower trend to make Milpa and availability of economic resources allow a major dependence from tortillas and commercial diets (Rejón and Segura, 1997).

It can be concluded that socio-economic status has a high influence on backyard animal production characteristics, it determines the number of animals kept and the technical level in animal rearing. The socio-economic status of the family was determined primarily by the employment opportunities of the household.

References

Aquino, R. E., Arroyo, L. A., Torres, H. G., Riestra, D. D., Gallardo, L. F. and López, Y. B. A.; El guajolote criollo (*Melagris gallopavo* L.) y la ganadería familiar en la zona centro del estado de Veracruz; *Tec Pecu Méx*; 41:165–173; 2003.

Barredo, P. L. H., Berdugo, R. J. G. and Velásquez, M. P. A.; Estudio de la ganadería de traspatio en el municipio de Mocochá, Yucatán; *Vet Mex*; 22:29–33; 1991.

Berdugo, J. and Franco, C.; Ganadería de traspatio en el estado de Yucatán.; in: *Memorias de la segunda reunión sobre producción animal tropical*; Universidad Autonoma de Yucatán, Mérida, Yucatán; 1990.

Berdugo, R. J. G.; *Estudio de la ganadería familiar en el municipio de Sucilá, Yucatán*; Master's thesis; Colegio de Postgraduados. Montecillos, Estado de México; México; 1987.

Duch, G. J.; La conformación territorial del Estado de Yucatán; Universidad de Autónoma de Chapingo, Centro Regional de la Península de Yucatán. México, D.F.; 1988.

Flores, G. S., Acosta, B. and Gomez, P. A.; *Etnoflora yucatanense, uso y manejo de plantas forrajeras para la cría de animales dentro del solar en una comunidad maya en Yucatán, Volumen 14*; Universidad Autonoma De Yucatán, Mérida, Yucatán, México; 1988.

Gongora, S., Richards, M. and Berdugo, R. J.; Análisis económico y social de la porcicultura rural de traspatio en los municipios de Mérida y Uman en el estado de Yucatán; *Vet Mex*; 50:115–126; 1986.

Nuncio, O. G., Nahed, T. J., Díaz, H. B., Escobedo, A. F. and Salvatierra, I. B.; Caracterización de los sistemas de producción ovina en el estado de Tabasco; *Agrociencia*; 35:469–477; 2001.

Ortega, L. M., Avendaño, S., Gomez, P. A. and Ucan, E. E.; Los solares de Chunchucmil, Yucatán, México; *Biotica, Nueva Epoca*; 1:37–51; 1993.

Rejón, A. M. and Segura, C. J. C.; Factores socioeconómicos asociados a la producción animal en la zona henequenera del estado de Yucatán, México; *Avances en Investigación Agropecuaria*; 6:14–20; 1997.

Rejón, A. M. J., Dájer, A. A. F. and Honhold, N.; Diagnostico comparativo de la ganadería de traspatio en las comunidades de Texán y Tzacala de la zona henequenera del estado de Yucatán; *Vet Méx*; 27:49–55; 1996.

Richards, E. M. and Leyva, M. C.; An example of the use of economic analysis in the definition of research and development priorities: Pig production in the henequen zone of Yucatan Mexico; *Res Dev Agric*; 2:7–17; 1985.

Rodríguez, B. J. C., Allaway, C. E., Wassink, G. J., Segura, C. J. C. and Rivera, O. T.; Estudio de la avicultura de traspatio en el municipio de Dzununcan, Yucatán; *Vet Méx*; 27:215–219; 1996.