Competitiveness of Milk Production in Nicaragua: An analysis of Productivity and Costs in Dual-Purpose Livestock Systems in the Matagalpa Region

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Keywords

Dairy cattle – Milk production – Productivity – Production cost – Farm results – Nicaragua.

Summary

This paper analyzed the productivity, economic results and milk production costs of dual-purpose livestock production systems located in the department of Matagalpa, in the central region of Nicaragua. Farm data were obtained from one-day interviews designed originally to be used for internal evaluation purposes for an agricultural development project. A total of 124 observations were collected on farm structure, sales, inputs and labor use, and stock of cattle. Only the pastoral (livestock) portion of the farm, which represented 83% of the land, was used for the analysis. For the purpose of organizing the data, they were divided into quartiles. It was found that the smaller farms used the land more intensively, and more productively. On the contrary, larger farms were characterized by higher productivities of their scarce resource, labor, in both cases, an indication of allocative efficiency. The family farm income, obtained after deducting cash expenses and depreciation from total receipts, was about 10 US$ per day and per person of family labor. The average short-run cost of milk production was 0.071 US$/L for the whole sample, while the average long-run cost was 0.236 US$/L. There was a strong negative relationship between cost of production and land productivity.

■ INTRODUCTION

Milk production in Nicaragua accounts for about 1.8-2.0% of the GDP, with about 660 million liters produced in 2005, and a long term trend of 5.6% growth for the period 1991-2005 (1), the highest rate in Central America. Also, the availability of milk per capita (115 L/person/year) is the second highest in the region (after Costa Rica), in parallel with the importance of milk and dairy products within the national diet.

According to the Third National Agricultural Census of 2001 (1) there were in Nicaragua 199,549 farms, and 96,994 of them had livestock, with a total herd of 2,656,939 head of bovine cattle. The proportion of adult females (cows and heifers of more than one year) was 56.7%, giving an indirect indication of the relative importance of dairying within the national herd. The available statistical information does not allow for a precise identification of dairy farms. Also, the nature of many production systems, which produce milk as a by-product of the livestock herd, makes it difficult to define what exactly constitutes a "dairy farm". There are about 55,000 farms which produce milk, i.e. 55% of all livestock farms, with an average production of 32 liters per day per farm (1).

Given the new economic environment in which these farms will have to operate, with more trade opportunities and higher international prices (3), but also under increased domestic competition, it is important to assess their competitiveness and, from a policy perspective, the factors that can improve or hinder it. Competitiveness is defined in the present case by the cost of milk production.

The productivity (and prices) of the factors of production are two of the key variables which explain the cost of production. In the case of farming, prices are external data and farmers are considered "price takers". Therefore, the key variable to be explained is productivity, because it is determinant for farmers and development programs to take decisions that have an influence on the competitiveness of the production system.

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In the context of dual-purpose (dairy and beef) production, where milk is basically a by-product of the system, traditional measures of productivity are more difficult to estimate and, more importantly, they may not have the same interpretation as in temperate, more intensive, dairy production systems (10). One example is the case of the cow yield, a traditional measure of productivity, which in the context of dual-purpose, low intensity, production systems, should be interpreted with caution, not only because cows produce both milk and beef (calves), but also because cows play a major role as a "saving fund" for small and medium size farmers.

Most of the technical and economic analyses of milk production available in Nicaragua come from intensive and specialized dairy production systems. Holmann (6) published a case study of two specialized dairy farms of different capital intensity in the departments of León (medium capital intensity) and Juigalpa (high capital intensity). The main difference between the two farms was the feeding system, with direct grazing (and the use of commercial concentrates) as the main source in León, while in Juigalpa the herd was kept in confinement with the sole use of concentrates and roughages, and no grazing.

The cost of production (considered as an indicator of competitiveness) was 0.22 US$/L for the semi-intensive system and 0.30 US$/L for the intensive one, without counting the opportunity cost of land, capital and family labor. Other studies showed similar results; e.g. Saavedra et al. report that the milk production cost in Nicaragua's specialized systems was 0.387 US$/L (11), approximately the same as that published by the Ministry of Agriculture and Forestry for the year 2001-2002 (8).

On the other hand, there is evidence that in less specialized and less capital intensive systems the cost of milk production is much lower. Holmann (5) analyzed four dual-purpose (dairy and beef) farms in Esquilpulas (department of Matagalpa), with an individual production level of 3.7 L/cow/day, and the cost (including the opportunity cost of family labor) was 0.20 US$/L.

Other countries also showed that dual-purpose production systems can be internationally competitive, at least from a cost of production perspective. The International Farm Comparison Network (IFCN) conducted production cost studies for different countries around the world. For example, for 30-cow dairy production systems in Brazil, cash costs were estimated at around 0.13 US$/L, and total costs at 0.215 US$/L. Outside Latin America, IFCN studies also showed that the cost of milk production fell between 0.10 and 0.20 US$/L (2).

Given the economic conditions of countries such as Nicaragua, with a few sectors which can afford to be internationally competitive, the dairy sector can provide good economic opportunities in terms of job creation and occupation of the territory. Therefore, the identification of the variables which explain the productivity and cost of milk production would provide useful information to dairy farmers as well as government programs, because they could be used to improve the competitiveness of the dairy chain. The objective of this paper was to evaluate the competitiveness of milk production in Nicaragua, through the analysis of productivity technical coefficients and costs of production in dairy farms.

■ MATERIALS AND METHODS

This study was conducted within the framework of an agricultural development project, FondeAgro, a joint project of the Ministry of Agriculture and Forestry of Nicaragua, and the Swedish International Development Agency. The sample concerned 124 dual-purpose (dairy and beef) farms located in the department of Matagalpa, in the counties of Muy Muy, Matiguas, Río Blanco and Paiwas. According to the Third National Agricultural Census of 2001, the Matagalpa department ranks second in terms of the size of the bovine herd, and it is one of the regions of the country where dairy production is developing fastest. Since 2003, and as a part of its internal evaluation process, the project has conducted an annual random survey on about 10% of the small and medium size livestock farms which constitute the population of the project. Many of these farms produced not only milk and beef, but also annual (maize) or perennial (coffee) crops. However, the main economic activity was the dual-purpose herd.

The sample used in April-May 2006 concerned 158 whole farm observations, which were obtained through interviews with the farmers. Not all the observations were used for the purpose of this analysis: 3 farms did not produce milk, 25 produced milk but only for family consumption, 2 had no land, and 4 provided inconsistent information. There remained 124 observations which the authors used for the study.

The information surveyed included: (a) characteristics of the farmers and his/her family, (b) structure of the farm, (c) in-house production and credit use, (d) crop production, (e) dairy production, (f) cattle stock and sales, (g) technology adoption, and (h) machinery and equipment in the farm. The information was gathered and later processed so as to be representative of the productive and market conditions of the year 2005-2006.

Milk production and milk price were recorded the day of the survey, which occurred during the summer (dry) season. Also, an estimate was obtained for production and price during the winter (rainy) season (September-October). Some farmers produced and sold a portion of their milk as curd, but for the purpose of productivity and economic analysis, curd production was converted back into milk quantities.

A proper assessment of livestock sales was more complicated, because only an inventory recorded the day of the survey was available, and differences between starting and ending stock numbers could not be estimated. Additionally, it was observed that reported sales were only 30% of the estimated birth rate, indicating a livestock build-up (the evaluation process of the project showed that, although there were very small changes in cow yields, important productivity improvements came from an increased stocking rate). Therefore, livestock sales were estimated under the assumption that the farmer would sell all his/her male calves (40% of the cows were reported as having calved) and the female calves in excess of the needs for replacement (18% of total cows).

Inputs and services purchased were valued using the information provided by the farmer whenever possible. However, when the data was not available, regional averages were used (consistent with the assumption of price-taking behavior), trying to represent the situation of the agricultural year of 2005-2006. The same criteria were used to estimate the value of farm improvements and machinery. It was difficult to obtain a market value for the land, mainly because its price had increased two or three-fold in recent years, making an objective evaluation very complicated, particularly at the farm level. Therefore, regional values were obtained from an informal survey of farmers and advisers at the time of the analysis (January 2007) and then individual farm values were estimated, correcting the regional values for the distance to all-time roads.

In order to estimate the opportunity cost of family labor, only those older than 14 years of age were considered, and the wage rate used was the same as the average rate for the region reported in the survey (about 60 US$/month). In the case of the farmer, his opportunity cost was assumed to be higher, at double the wage rate for the region, considering that he provided manual and management labor.

The opportunity cost of land was estimated as 2% of its value (free of land improvements), since it was clear that there was sustained increase in the real value of this resource. The opportunity cost of capital invested in the farm was estimated as 4% for farm improvements (at half its useful life), 6% for machinery and equipment (at half their useful life) and 8% for livestock. Depreciation was estimated using a linear method, with 20 and 15 years of useful life for improvement and machinery, and no salvage value.

The analysis of the information was divided into four parts. The first is a descriptive analysis of the structure and resource use in the farms. In the second part, technical and productivity indicators were estimated. The third and fourth parts consisted in estimating the economic performance and cost of milk production.

Economic performance indicators were estimated by starting using a variant of the methodology proposed by the International Farm Comparison Network (4), which starts with the gross revenue of the farm (in this case, only the livestock portion of the farm), and then subtracts expenses, depreciation and opportunity costs, in the following way:

+ Total receipts (milk, milk-equivalent beef production, milk as "curd")
– Operating (cash) expenses
= Net cash farm income
– Depreciation
= Family farm income (or net income)
– Opportunity cost of family labor
= Management and investment income.

The management and investment income divided by the value of land plus capital (improvements, machinery and livestock) gives a rough idea of the return on capital. The last indicator was the (average) cost of milk production, distinguishing between a short-run production cost (SRPC) and a long-run production cost (LRPC). The average SRPC was obtained as the sum of cash costs and depreciation, divided by the number of liters of milk production. The average LRPC included also the opportunity costs of land, capital and family labor.

In the calculation of (long run) costs of production, the use of regional estimates of opportunity costs of owned resources poses some problems. By definition, since the opportunity cost is the net income a resource could obtain in its best alternative use, the true estimate is specific to each producer at a given time, and it is very subjective, particularly in the case of family labor. Perhaps for this reason, in many countries, the calculation of agricultural production costs only includes monetary expenses and depreciation.

However, in the case of Nicaragua, given the low level of monetary expenses associated with livestock production, it was decided that short-run production cost estimates should be complemented with long-run ones, providing a more complete picture of the need of resources for milk production. The assumptions regarding the opportunity costs for owned resources were explained at the beginning of this section.

The methodology commonly used for the calculation of milk production costs subtracts the sales of cattle and other by-products from total operating expenses. The (strong) assumption is that products other than milk are produced at a cost equal to its revenue. However, the method works well when cattle sales (the main product of the dairy farm) account for less than 80-85% of the total revenue, which, of course, was not the case of these dual-purpose farms. Therefore, economic performance and cost of production results should be taken with caution.

■ RESULTS

Productive structure of the farms

Table I shows the structural dimensions of the farms in terms of availability of land and labor. Because of the widespread relationship between size and cost in dairy farming (7, 13), the data were organized into four quartiles using the pastoral area as the classificatory variable.

The farms under study, compared with those of other countries of Central America, or even other regions of Nicaragua, were mostly of medium size, with an average of 54.7 ha per farm, with 45.4 devoted to livestock production. The table also showed an inverse relationship between size and the adoption of improved pastures, with the smaller farms having a larger proportion than the bigger ones.

The availability of family labor was fairly constant among groups, but the larger farms had more hired labor, and in the fourth quartile the amount of hired labor was larger than the amount of family labor. Considering both, family and hired labor, small farms were much more labor intensive than larger farms, with a land to labor ratio of 4.1 in the first quartile, increasing to 25.7 in the fourth quartile, i.e. the largest farms were more than six times less intensive in labor than the smaller farms.

Table II shows the main characteristics of the herds. The size increased from the first to the fourth quartile (on average 63 head/herd). Roughly 50% of the cattle were cows, and not necessarily dairy cows since a number of them were not milked. However, the

Table I

Land use and labor availability

Indicator	Unit	1st quartile	2nd quartile	3rd quartile	4th quartile	Average
Farm area	ha	14.4	27.6	51.9	125.2	54.7
Pastoral area (PA)	ha	9.5	22.1	37.5	112.4	45.4
Area with improved pastures (IP)	ha	2.7	4.1	4.6	8.9	4.4
IP/AP ratio	%	28.4	18.6	12.3	7.9	9.7
Family labor (FL)	ME*	2.45	1.90	2.42	2.29	2.27
Hired labor (HL)	ME	1.10	1.44	1.47	2.58	1.79
FL / (FL + HL)	%	69.0	56.9	62.2	47.0	55.9

* Man equivalent, i.e. all persons 14 years or older working on the farm

ratio between the number of cows and the total size of the herds gave an indirect indication of the dairy orientation of the farms. It showed that with 55.6% the smaller farms had a dairy orientation more pronounced than the larger farms with 48.4%.

The smaller farms were also more intensive than the larger ones in terms of stocking rate, with 1.18 animal unit per hectare, compared with only 0.67 animal unit per hectare in the fourth quartile (with adult cows = 1.00, calves under 1 year = 0.25, heifers = 0.50, steers = 0.75, young bulls = 1.00, and mature bulls = 1.20). Figure 1 presents the structure of capital or the resources owned by the farmers. For the average farm, the total value of these resources was about 70,000 US$, with 68% accounting for land, 26.5% for livestock and the remaining 5.5% for improvements and machinery, following the same pattern found by Rivas and Holmann (10) for double-purpose production systems in Colombia.

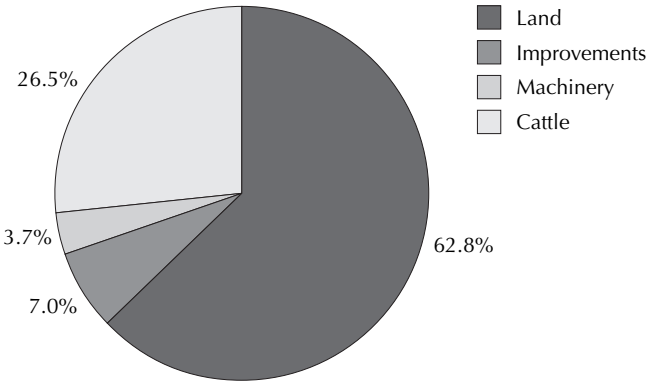

Figure 1: *Relative importance of land and capital in dual-purpose livestock farms, Matagalpa, Nicaragua (2006).*

Production and productivity

Figure 2 shows the distribution of annual milk production in the sample (milk production plus milk-equivalent cattle sales): 49% of the farms produced less than 30,000 L of milk and milk equivalent per year, while 33% of them produced between 30 and 60,000 L. The majority of the farmers (82%) produced less than 160 L of milk per day, with a distribution very skewed (a few farms produced a lot more).

Table III shows three indicators of productivity. Individual productivity is widely, and wrongly used as an indicator of efficiency throughout tropical and subtropical production systems. In the study, individual productivity (L/cow) was low. Land productivity was a more comprehensive indicator of efficiency in pastoral-based production systems. Finally, a measure of labor productivity was calculated, with wide differences between small and large farms. Taken together, land and labor productivity showed that farms of different sizes chose a combination of resources that fit their relative availability, smaller size farms using more labor and less land per unit of output and, conversely, larger size ones using less labor and more land per unit of output.

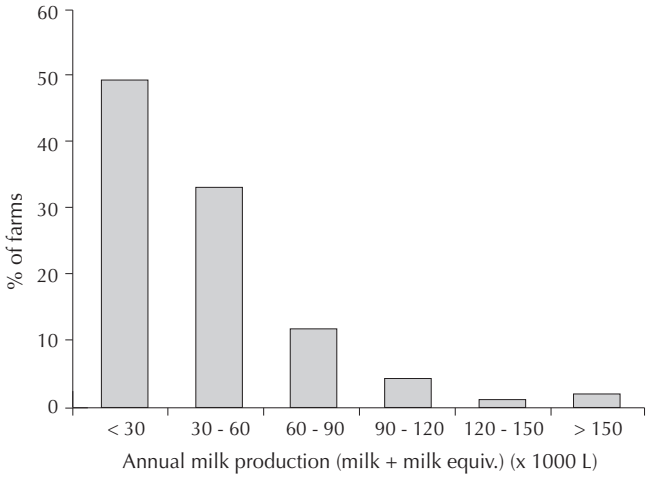

Figure 2: *Frequency distribution of milk production (L/year), Matagalpa, Nicaragua, 2006.*

Table II

Main characteristics of the herds

Indicator	Unit	1st quartile	2nd quartile	3rd quartile	4th quartile	Average
Herd size (HS)	Head	21.2	37.5	54.0	140.5	63.3
Total cows (TC)	Head	11.8	18.3	26.2	64.4	30.7
Dairy orientation	TC/HS	55.6	48.8	48.5	45.8	48.4
Stocking rate	Animal unit/ha	1.18	0.83	0.74	0.67	0.85

Table III

Productivity measurements of dairy farms

Indicator	Unit	1st quartile	2nd quartile	3rd quartile	4th quartile	Average
Cow yield	L/cow/day	3.76	3.61	3.62	3.50	3.62
Land productivity	L/ha/year	814.2	571.0	496.0	355.8	557.8
Labor productivity	L/ME*/year	7278	9888	12,813	20,136	12,528

* Man equivalent, i.e. all persons 14 years or older working on the farm

Economic performance

The economic results presented below are only for the pastoral portion of the farm. It meant that revenues and costs (including cash costs, depreciation and opportunity costs) associated to annual and perennial crops were not considered for the analysis. When revenues and costs could not be allocated directly to different activities, the basic allocation criterion was the ratio between the livestock area and the total area.

Table IV shows the average economic performance for the sample and for each of the four quartiles. The average gross revenue was 6772.7 US$ per year, equivalent to less than 20 US$ per day, with family farm income averaging roughly 10 US$ per day for the average farm. Having accounted already for all cash expenses and depreciation of fixed assets, this indicator (family farm income) represents the amount of money that the family can spend in consumption or investment.

The opportunity cost of family labor was comparatively higher in the smaller farms, therefore, the management and investment income indicator was almost zero in the lower quartile. The same behavior showed the profitability ratio, or return on capital. However, given the conditions of widespread unemployment which prevail in Nicaragua, it could be argued that the true opportunity cost of family labor, in many cases, approaches zero. When this assumption is made, then the family farm income indicator becomes equal to the management and investment income indicator. Also, the return on capital increases to 9.0% for the first quartile, 6.5% for the second, 5.8% for the third, and 4.1% for the largest quartile.

Milk production costs

In Table V, two estimates of the average costs of milk production for the four quartiles and the sample average are presented. The short-run average production cost (SRAPC, in US$/L), is the sum of operating (cash) expenses and depreciation minus cattle sales. The interpretation of this indicator is that in the short run the milk price should be at a level which allows the farm to cover all its cash expenses and the depreciation of improvements and machinery, in this case 0.082 US$/L of milk.

The second estimate is the long-run average production cost (LRAPC), which includes also the opportunity costs of the owned factors of production (land, capital and family labor). LRAPC is in theory equivalent to the minimum price required for the sale of milk while keeping the resources in the farm in the long run, in this case 0.236 US$/L of milk for the average farm in the sample.

■ DISCUSSION

The analysis of the productivity indicators of Table III can be put within the framework of technical and allocative efficiency (12). These dual-purpose farms seemed to be technically inefficient, in the sense that many of them obtained less output per unit of input used in production. On the other hand, they seemed to maximize the productivity of their scarcer resources, giving an indication that they were more efficient in the allocative sense. As mentioned before, smaller size farms used more labor and less land per unit of output, and larger size ones used less labor and more land per unit of output.

Table IV

Indicators of economic performance

Indicator	Unit	1st quartile	2nd quartile	3rd quartile	4th quartile	Average
Total receipts (gross revenue)	US$/yr	2696.6	4502.4	6556.5	13,276.5	6772.7
– Operating (cash) expenses	US$/yr	876.0	1669.9	2472.0	5927.2	2736.2
= Net cash farm income	US$/yr	1820.6	2832.5	4084.5	7349.3	4036.5
– Depreciation	US$/yr	111.2	274.8	371.6	668.8	356.6
= Family farm income	US$/yr	1709.4	2557.7	3712.9	6680.5	3679.9
– Opportunity of family labor	US$/yr	1655.1	1662.9	1900.3	2112.9	1832.8
= Management and invest. income	US$/yr	54.3	894.8	1812.6	4567.6	1847.1
Return on capital	%	0.29	2.28	2.85	2.79	2.57

Table V

Short- and long-run (average) costs of milk production

Indicator	Unit	1st quartile	2nd quartile	3rd quartile	4th quartile	Average
Operating expenses	US$/L	0.063	0.071	0.070	0.084	0.071
+ Depreciation	US$/L	0.009	0.014	0.011	0.011	0.011
= Short-run production cost	US$/L	0.072	0.085	0.081	0.095	0.082
+ Opport. cost of family labor	US$/L	0.158	0.091	0.072	0.036	0.089
+ Opport. cost of capital	US$/L	0.049	0.061	0.066	0.083	0.065
= Long-run production cost	US$/L	0.279	0.237	0.219	0.214	0.236

One of the dimensions of technical efficiency was land productivity, which was explained basically by the stocking rate, with a strong positive relationship between the two variables, as shown in Figure 3. On the other hand, the cow yield, a widely used measure of productivity, did not show a consistent pattern of variation between the farms, nor was its range too wide. These results suggest that to increase productivity pastures need to be improved and the stocking rate increased.

Many studies of agricultural production systems in the tropical regions are based in case studies of a small sample of farms (10). In other cases, a form of "synthetic" methodology is used (4), which replaces the use of real farm data with models whose main characteristics are defined by researchers and farm advisers. In the present study, the availability of 124 farm observations not only reinforced the analysis with strong empirical support, but also allowed for a more in-depth exploration of the factors which explained the behavior of the "performance" variables.

Figure 4 shows the relationship between the family farm income per hectare and the size of the pastoral area of the farm also in hectares. In other studies (10), a positive relationship between the two variables has been found, due to the reduction of unit fixed costs with the size of the farm. In the present study, however, a somewhat negative relationship was observed, and could be explained by the low proportion of cash fixed costs within the farm expenses (family labor opportunity cost is excluded in the calculation).

Productivity was expected to be directly correlated with the family farm income. In Figure 5 the authors explored the relationship between the net income per hectare of livestock area and land productivity and found a positive relationship, as expected. Moreover, since land productivity was inversely related with the farm size, it could be argued that the net farm income was also inversely related with the size.

Regarding the correspondence of cost of production and productivity, it was found that SRAPC increased with the size of the farms (Table V), contrary to most reports in other parts of the world (13). However, this finding was consistent with the negative relationship between productivity and size. In other words, the larger farms were less efficient in their use of resources. The absolute value of the SRAPC may also be strikingly small, but it is consistent with other studies (2, 10), and it is an indication of the very low use of inputs per unit of fixed resources.

LRAPC was different in that it decreased with the size of the farms from 0.276 US$/L in the smaller quartile to 0.214 US$/L in the larger quartile, with an average for the sample of 0.236 US$/L. This reduction in the cost of production with the size of the farm is exclusively due to the reduction in the opportunity cost of family labor (from 0.158 US$/L to 0.036 US$/L), because the cost of capital and land increases with the size (again, due to lower land productivity) (Figure 6).

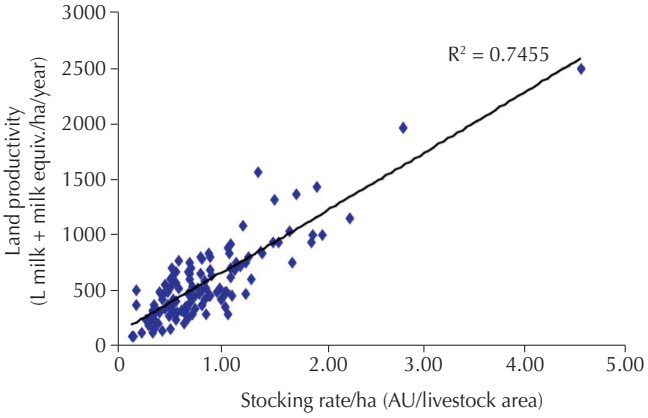

Figure 3: *Relationship between land productivity and stocking rate.*

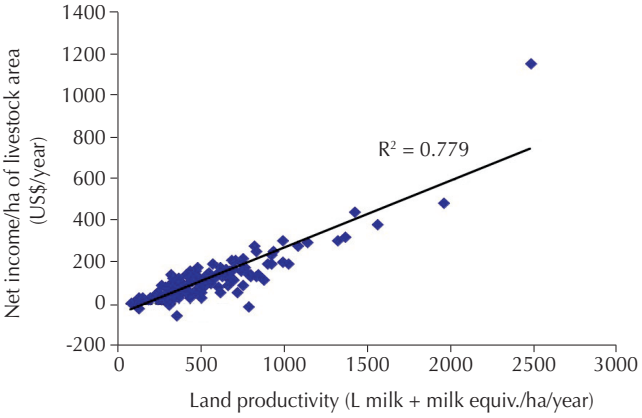

Figure 5: *Relationship between the family farm income and land productivity.*

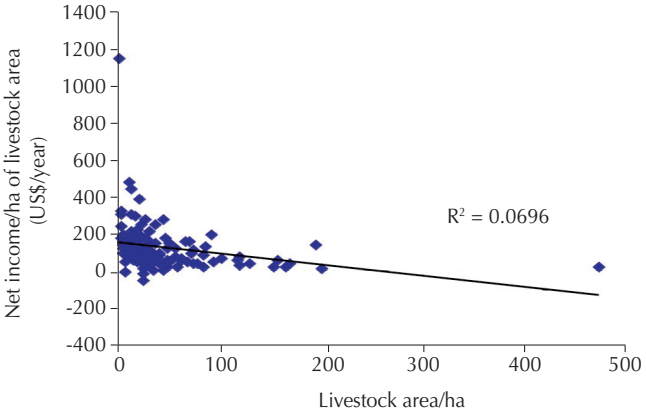

Figure 4: *Relationship between the family farm income per hectare and the size of the farm.*

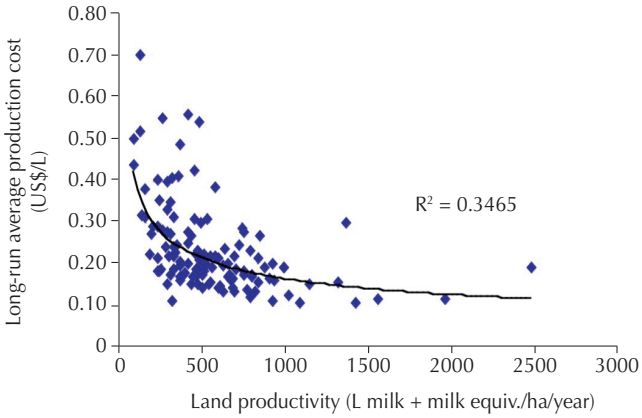

Figure 6: *Relationship between the long run average production cost and land productivity.*

As mentioned before, the traditional relationship between size and cost was not observed (usually a U-shaped curve or an exponential one, asymptotic to some minimum level of cost). The reason was probably a (strong) negative relation between productivity and size. However, when the size was measured in annual production rather than in land area, the traditional "economies of size" relationship appeared more clearly (Figure 7).

The estimates for the cost of milk production obtained in this study are consistent with those of the literature (4). They indicate that there are many dairy farms in non-traditional dairy countries, located in tropical or subtropical regions, which are very competitive by international comparison, with a total average cost ranging between 0,15 and 0,30 US$/L.

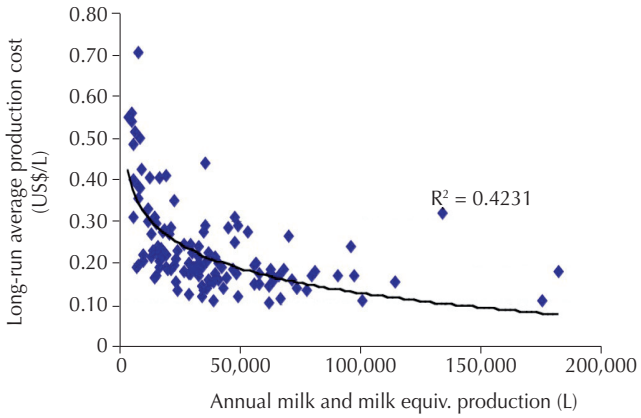

Figure 7: *Relationship between the long run average production cost and the volume of milk production.*

■ CONCLUSION

Regarding the structure of production, in particular in relation with the availability of land and the use of hired labor, the farms studied were not traditional peasant farms but rather trade-oriented ones, although the capital/labor ratio was in general low. There is a lot of room for improvement in the technical efficiency of dual-purpose farms in this region of Nicaragua, since the results showed that there was a high variability in land productivity between farms, which was best explained by the stocking rate. In turn, land productivity was a good explanatory variable of the family farm income, and it was also highly negatively correlated with the cost of milk production (LRAPC).

The short-run costs of production of these systems were very low with less than 0.10 US$/L (0.071 US$/L on average) and the long-run costs higher with 0.236 US$/L on average, making these farms very competitive in the current international trade environment. Additionally, the large difference between the cost of production estimates indicates that this sample of dairy farms had the ability to sustain (at least in the short run) periods of price instability, which are typical of the international dairy market.

These findings have strong implications for the farmers themselves and for the dairy sector of Nicaragua. From the individual farmer perspective, the key to improve productivity and reduce the cost of production is to increase the stocking rate. However, the data showed a weak (although positive) relationship between improved pastures and stocking rate, indicating the need for more research on the variables which best explain productivity and efficiency.

In addition to the efficiency of milk production measured through the cost of production, there are other requirements for international competitiveness, such as milk quality at the farm level and, of course, efficiency at other stages of the dairy chain, such as transportation, manufacturing and marketing. Therefore, the results of this study should be taken with caution, since only farm production costs for a specific region are considered.

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Résumé

Galetto A., López W., Baumeister E. Compétitivité de la production laitière au Nicaragua : analyse de la productivité et des coûts dans les élevages laitiers et à viande de la région de Matagalpa

L'article analyse la productivité, les résultats économiques et les coûts de la production laitière de systèmes d'élevage laitier et à viande dans le département de Matagalpa, situé dans la région centre du Nicaragua. Les données sur les exploitations ont été obtenues à partir d'interviews d'un jour, destinées à l'origine à être utilisées à des fins d'évaluation interne pour un projet de développement agricole. Au total 124 observations ont été relevées sur la structure des élevages, les ventes, l'utilisation d'intrants, l'emploi de main d'œuvre et le cheptel. Seule la zone de pâturage des bovins, qui représentait 83 p. 100 des terres, a été utilisée dans l'analyse. Les données on été divisées en quartiles afin de les organiser. Les résultats ont montré que les élevages les plus petits utilisaient la terre de manière plus intensive et avaient une productivité plus grande. Au contraire, les élevages plus grands étaient caractérisés par une productivité plus élevée de leur ressource rare, la main d'œuvre, une indication dans les deux cas de l'efficacité de leur répartition. Le revenu familial, obtenu après déduction des dépenses en liquide et de la dépréciation des recettes totales, a été de 10 $ US par jour et par personne de la famille ayant une activité sur l'exploitation. Le coût moyen de la production de lait à court terme a été de 0,071 $/L pour l'ensemble de l'échantillon, alors que sur le long terme il a été de 0,236 $/L. Il y a eu une forte relation négative entre le coût de production et la productivité de la terre.

Mots-clés : Bovin laitier – Production laitière – Productivité – Coûts de production – Résultat de l'exploitation agricole – Nicaragua.

Resumen

Galetto A., López W., Baumeister E. Competitividad de la producción lechera en Nicaragua: Análisis de la productividad y los costos en sistemas lecheros de doble propósito en el departamento de Matagalpa

El presente artículo analiza la productividad, los resultados económicos y los costos de producción de leche en los sistemas de producción de doble propósito localizados en el departamento de Matagalpa, en la región central de Nicaragua. Se obtuvieron datos en las fincas mediante entrevistas de un día, diseñadas originalmente para uso en evaluaciones internas del proyecto de desarrollo agrícola y resultando en 124 observaciones de la estructura de la finca, las ventas, el uso de recursos y de labor y el inventario de ganado. Para el análisis se utilizó únicamente la parte pastoral (ganadera) de la finca, la que representó 83% del terreno. Con fines de organización, los datos se dividieron en cuatro cuartiles. Se encontró que las fincas más pequeñas usaban el terreno más intensamente y con mayor productividad. Las fincas más grandes, por el contrario, se caracterizaron por productividades mayores de sus escasos recursos, labor, en ambos casos, una indicación de la eficiencia de la repartición. El ingreso familiar de la finca, obtenido después de deducir los gastos en especies y la depreciación de las recetas totales, fue de 10 US$ por día y por persona en labor familiar. El costo promedio a corto plazo de la producción de leche fue de 0.071 US$/L para toda la muestra, mientras que el costo promedio a largo plazo fue de 0.236 US$/L. Se encontró una fuerte relación negativa entre el costo de la producción y la productividad del terreno.

Palabras clave: Ganado de leche – Producción lechera – Productividad – Costo de producción – Resultado de la explotación – Nicaragua.