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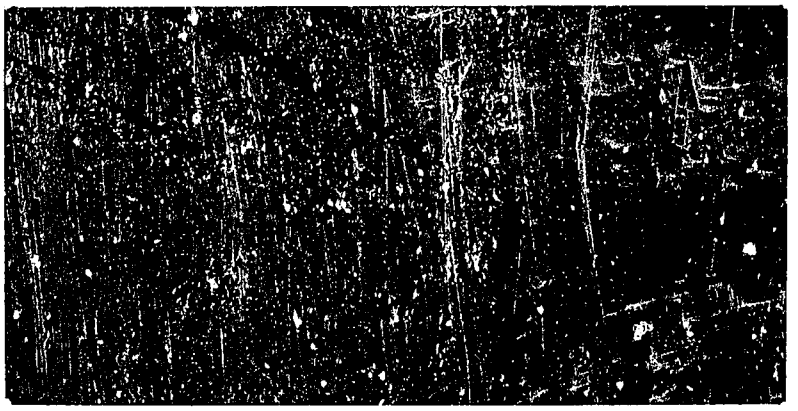

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PEASANT PRODUCTION IN NORTHEAST BRAZIL: THE CASE OF GOAT PRODUCTION IN CARIRIS VELHOS, PARAIBA

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ABSTRACT

Peasant livestock production systems in two Municipios in the State of Paraiba -- Soledade and Sao Joao do Cariri-- are examined in this report. The purposes of this study are to 1) identify the socio-economic role of goats within the structure and operation of existing peasant production systems and 2) to identify the problems and potentials of of increased production and marketing of goats and goat dairy products. The focus of this study are the small semi-subsistence peasant producer

Peasant production in Paraiba is very diversified in order to respond to climatic and economic risks. Goat production is one dimension of an overall production strategy and cannot be viewed in isolation. In the municipios studied the production of goats for meat is an important economic activity. Goats are seen as a source of cash which could be used to purchase inputs for other farming operations and as a source of emergency cash for the family. Goats are not seen as a subsistence crop. Goats are a cash reserve and are marketed in response to a family's cash needs rather than in response to market forces.

The importance of goats as a source of cash and their hardiness make them attractive investments. The respondents are interested in expanding goat production and feel that there is a large demand for goat meat, hides, and milk. This interest in expanded goat production may not lead to the adoption of improved technologies. Increased goat production -- especially dairy production -- requires intensification of production and the investment in inputs and technology. This would be extremely difficult for poor peasants as they presently raise goats because goats do not require high investments and because they are short of capital.

It is not clear at this time whether dairy goat production would be profitable for small producers. At the time of this study the cost of animal feed is rising faster than the price of goat products. If a means could be found to give small producers access to significant amounts of capital and if prices for goat cheese were favorable, peasants might be interested in dairy goat production. Peasant families possess sufficient labor to carry out this activity and have a need for more income. Without drastic changes in the production system, improving the production and marketing of goats for meat more holds potential for improving the lives of peasants than does dairy production.

The report makes five recommendations: 1) that government sponsored goat research be directed to the development of technologies requiring little capital investment and which utilize locally produced materials; 2) that research and extension agencies place emphasis on basic prophylactic measures which will show clear results in short periods of time; 3) that the state take on the responsibility of improving the access of peasants to land and water so that they may have the means to adopt new technologies; 4) that efforts be made to improve local transportation and marketing infrastructure in order to increase income from the sale of livestock and 5) that the government develop financial and technological programs aimed specifically at improving the well-being of small producers.

RESUMO

Neste relatório são analisados sistemas tradicionais de produção animal em dois Municipios do Estado de Paraiba -- Soledade e Sao João de Cariri. Os objectivos deste estudo eram 1) Identificar o papel socio-económico dos caprinos dentro da extutura e acção dos sistemas de produção tradocionais existentes e 2) Identificar os problemas e potencialidades do incremento da produção e mercado de caprinos assim como de leite de cabra e seus derivados. O fulcro deste estudo era pois o peueno produtor tradicional em semi-subsistencia.

A produção tradicional em Paraiba e muito deversificada a fim de responder a riscos económicos e climatéricos. A produção de caprinos é um sub-sector na estratégia de produção global e não pode ser analizada isoladamente. Nos Municipios em estudo a caprinicultura de carne era uma actividade económica importante. Os caprinos eram vistos como um manancial de rendimento o qual poderia ser usado na compra de inputs para outras actividades agrícolas ou como fundo de emergencia para a manutenção familiar. A produção de caprinos não era vista como uma actividade agrícola de subsistencia. Os caprinos representavam fundos de reserva e a sua venda era efectuada mais em resposta as necessidades monetárias familiares do que em resposta as forças do mercado.

A importancia dos caprinos como fonte monetária e o seu vigor, tornaram a caprinicultura um investimento atractivo. Os agricultores enteressados tinham interesse em expandir a caprinicultura e apreceberam-se que existia uma larga procura para carne, peles e leite de caprino. Este interesse na expansão da caprinicultura pode não conduzir a adopção de tecnologias melhoradas.

O acréscimo na produção caprina (especialmente produção leirteira) necessita intensificação de produção e investimento em inputs e tecnologia. Isto seria extremamente difícil para agricultores pobres porque presentemente estes dedicam-se á criação de caprinos, exactamente devido a esta actividade não necessitar grandes investimentos e porque os agricultores pobres têm falta de recursos de capital.

Até ao presente momento não está bem claro se a produção caprina será ou não lucrativa para pequenos produtores. Ao tempo do presente estudo os custos da alimentacao animal subiam a uma taxa mais rápida qui os preços dos productos provenientes da caprinicultura. Se alguma solução podesse ser encontrada a fim de dar aos pequenos productores acesso a significativa quantidade de capital e se os precos dos caprinos e quiejo fossem favoráveis, os pequenos agricultores poderiam estar interessados na produção de caprinos leiteiros. As familias de agricultores possuem suficiente forca de trabalho para se dedicarem a esta actividade mas tem necessidade de mais rendimento. Não recorrendo a mudancas drásticas no sistema de produção a melforia da produção e mercado de caprinos de carne apresenta melhores potencialidades para a melhoria de vida do productor que a produção leiteira.

O relatório faz cinco recomendações: 1)- Que a investigacao em caprinicultura apoiada pelo governo seja dirigida para o desenvolvimento de tecnologias necessitando pouco investimento em capital e que utilizem materiais produzidos localmente; 2)- Que as Estações de Investigação e Extensão dediquem particular atenção ás medidadas de profilaxia básica quie demonstrem claros e eficientes resultados em curtos periodos de tempo; 3)- Que o Estado assuma a responsabilidade pela melhoria de acesso dos agricultores a recursos como terra e água a fim de que estes tenham os meios necessários a adopção de novas tecnologias; 4)- Que sejam

desenvolvidos esforços para o melhoramento de meios de transporte e infraextruturas de mercado a fim de aumentar os rendimentos de venda do gado e 5)- Que o Governo desenvolva programas financeiros e tecnológicos com o fim de melhorar o bem estar dos pequenos productores.

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INTRODUCTION

This report is one of the three that have been prepared by the Sociology component of the Small Ruminant-Collaborative Research Support Program (SR-CRSP) in Northeast Brazil. The other two reports presented the main findings of research projects on goat production in the states of Ceara and Bahia (Primov, 1982; 1984). The findings reported here are based on research on small farm goat production in the state of Paraiba.

The findings and recommendations presented in this report are applicable to the specific situation of small producers within the microregion of Cariris Velhos. Considering that significant differences were found within the microregion itself, we suggest that the data provided here should not be used for generalizations concerning the northeast as a whole. Instead, other similar projects conducted with economists in other gost producing micro-regions should provide important information for goat production projects.

This study is approached from the perspective that greater awareness of actual conditions will contribute to more realistic research and development programs. The research problem involves two general issues: first, the understanding of goat production within a broader context of total production systems. Second, the assessment of the constraints and potentials to increase goat productivity and commoditization within the framework of the survival strategies of the local peasant producers. The importance of understanding the dynamics of peasant goat production within such a wide context is based on the fact that unless one knows the forces behind production strategies traditionally undertaken by peasants, attempts to introduce new technologies and therefore to increase peasants' market interaction might be deemed to failure.

The main preoccupations in this study were as follows. First, we tried to identify the local peasant form of production. This required addressing the following issues: peasants' low access to resources (land, water, capital, labor), the diversification of production systems at farm levels, the utilization of labor intensive and capital extensive technologies, the irregular participation in the market, the partial reliance on wage labor and the maximum utilization of unpaid family labor, households' flexibility concerning personal consumption, and the ultimate goal of household survival and subsistence as main factors influencing peasant production strategies.

Second, we collected baseline information on goat production systems, on their role compared to other production activities within peasant households' total production strategies. This was to be the basis for an assessment of the possibilities for introducing new technologies and of the potential impacts of efforts to raise goat productivity.

Third, we tried to assess the potential impact of increasing goat production in the area as leading either to the proletarianization or capitalization of the producers included in our sample. The proletarianization process refers to the transformation of independent small producers into a wage laborers. The capitalization process, on the other hand, refers to the transformation of these producers into small capitalists who exploit the labor of others. Furthermore, we considered the possibility that the proletarianization process did not require the complete alienation of those producers from the land. For example, a peasantry which although keeping the property of land was not free to act upon the means of production and were increasingly incorporated into the larger economy as wage laborers and/or impoverished small-scale family farms.

This study was conducted also in order to provide answers to a few questions about the potential for increasing goat production in Brazil. Our first assumption whether or not the peasants' low economic, political and social positions would prevent them from responding to government incentives for increasing goat/goat milk production.

Our second question was whether the state aim of increasing peasant goat production and commoditization would actually upgrade the quality of life of the extremely poor. In fact, there was a possibility of further deterioration of peasant conditions by means of an increasing participation in market relations. These factors might be overcome by means of crucial state actions such as: an agrarian reform, the creation of a strong infrastructure (roads, dams, storage facilities, processing industries), and a significant increase of the rural poor population's participation in the decision-making process which are directly related to them (such as policies concerning rural credit, prices for agricultural products, etc). As no such changes have been undertaken by the government since this research was completed, the results we obtained are probably the same as we would collect today.

RESEARCH SETTING AND METHODOLOGY

Research was conducted in the municipios of Soledade and Soa Joao do Cariris, within the ecological and socio-economic microregion of Cariris Velhos, in the state of Paraiba.[1] A brief overview of the ecological and socio-economic characteristics of these units follows.

a. Research Setting

The municipio of Soledade

Soledade occupies an area of 586 km^2 and had a demographic density of 15.58 inhabitants per km^2 in 1980. Its population was 7,888 in 1970, as compared to 9,452 in 1980. Among them, 9,130 people were actually living in Soledade, of which 4,876 were in the rural areas. (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1981)

Average rainfall between 1977 and 1978 was 579.51mm.[2] However, between 1978 and 1982 the actual rainfall was much lower. The municipio has six small rivers, all of which have seasonal flows, and six dams (four of which are for fish hatcheries, one is exclusively for potable water storage, and another serves both purposes). Soledad's temperature varies between 18°C and 30°C, averaging 26°C. Its altitude is about 521m. Its soils are 60 percent sand and clay. (Empresa de Assistencia Tecnica e Extensao Rural, 1979b)

Soledade's main economic activity is agriculture. In 1980 it produced 18 percent of the microregion's sisal and 29 percent of its forage (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1982b). Most farmers, and particularly the smallholders produce corn, beans, and cotton, besides a wide variety of fruits and vegetables. Most of this production, however, with the exception of cotton, is consumed by the producer's household. Soledade's yearly crop production area has increased from 2,837ha in 1975 to 5,309ha in 1980 whereas annual crop production area has decreased from 4,511ha in 1970 to 2,318ha in 1980 (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1981).

Livestock production in Soledade is not very significant, either at the state or at the microregional level. In 1979 it produced only 8 percent of Cariris Velhos' sheep, 7 percent of its goats and 4 percent of its cattle, poultry and swine (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1980). However, by 1980 it had only 4 percent of the goats and 5 percent of the sheep within the microregion (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1982a).

Soledade's main village is an important marketing center both for Soledade and its surrounding municipios' agricultural production. The municipio's infrastructure is relatively well developed, particularly in terms of roads and banking institutions. These are perhaps some of the reasons local farmers are more market oriented than in some of the neighboring municipios.

The Municipio of Sao Joao do Cariri

Sao Joao do Cariri has an area of 1,061 km^2 and in 1980 a demographic density of 7.33 inhabitants per km^2. Its population in 1970 was 9,003 as compared to 7,884 in 1980. About 5,926 inhabitants lived in the rural areas. (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1981)

Average rainfall between 1977 and 1978 was 418,4mm.[3] However, as in the case of Soledade, the rainfall between 1978 and 1982 was significantly lower. The municipio has two temporary rivers, six temporary streams, and three dams. None of the dams are used for irrigation; they provide the water supply to the population. Sao Joao's temperature varies between 16°C and 31°C, with an average of 25 to 30°C. Seventy-five percent of its soil is sand and clay. (Empresa De Assistencia Tecnica e Extensao Rural, 1979a)

Sao Joao do Cariri has a very limited agricultural production. As in Soledade, most peasants produce cotton as a cash crop; corn, beans, and a variety of fruits and vegetables mostly for home consumption. Its yearly crop production area has increased from 3,875ha in 1975 to 7,973ha in 1980 whereas the area devoted to annual crops has decreased from 2,757ha in 1970 to 528ha in 1980 (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1981).

The contribution of livestock production to the municipio's income has decreased from 34 percent to 22 percent of the total, whereas crop production's contribution has increased from 56 to 73 percent between 1976 and 1978. (Empresa de Assistencia Tecnica e Extensao Rural, 1979b). In 1980, the municipios had 6 percent of Cariris Velhos's goats, 7 percent of its sheep, and 4 percent of its cattle. (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1982a)

Sao Joao do Cariri's main village is much smaller than Soledade's and its weekly market is much less important for the local economy than the latter. In fact, medium and large animals are not sold there; rather they are taken either to the neighboring municipio of Serra Branca or to Soledade. Sao Joao's roads leading to the villages are fewer and in worse conditions than those in Soledade. Therefore, the transportation of goods to and from the markets is difficult, as not many people make a living out of transportating people and agricultural products. Isolated farmers depend almost completely on bulkers for the sale of products.

b. Methodology

This section details the sampling procedure, data collection, data content, and analysis methods used in this study. It also identifies some of the analytic factors concerning the research.

Sampling

The sample consisted of peasant producers in the municipios of Soledade and Sao Joao do Cariri.

Soledade was selected because it housed an experiment station, Estacao Experimental Pendencia, which conducts research on goats and particularly on goat milk production. Sao Joao do Cariri was chosen as the second site because it has an average goat density of 17.7 goats per km^2, a density equal to that of the microregion as a whole (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1980). Furthermore, it will be the site of a goat production development station operated by the Universidade Federal de Paraiba. The microregion contains a municipio with a very high goat density, Barra de Sao Miguel, with 49.9 goats per km^2; however heavy rains prevented access to the site.

Lack of reliable data on goat production per farm prevented the utilization of a random sampling research design.[4] Thus, a strategy of purposive sampling was selected, according to which informants were selected as we departed from the municipio's main village, in different directions, and conducted interviews with accessible goat producers living along unpaved roads.

Producers were selected on the basis of predetermined farm size categories. These categories were: a) 50ha or less; b)51ha to 100ha; and, c) 101ha to 150ha. The number of cases within each category was proportional to their approximate number in the municipio. This yielded 30 cases for farms of the smallest category, 7 for those of intermediate size, and 6 for the largest size.

A total of 43 producers, 25 of which were in Soledade and 18 in Sao Joao do Cariri, were interviewed between October 1982 and March 1983.

Data Collection, Content, and Analysis Methods

Farmers were interviewed individually at their farm. By and large, male heads of households were interviewed; in their absence, the wives were interviewed. Most farmers were interviewed one or two times; follow-ups were conducted whenever questionnaires could not be completed in one visit or when answers were unclear. Field notes about each visit were also kept.

Two kinds of questionnaires were applied in each of the municipios. One half of the sample of each municipio was given a short questionnaire; the other half, the longer one. The decision concerning which one to use was made in the field, according to the farmers' time availabililty and willingness to provide information.

The short questionnaire had 15 questions dealing specifically with goat and goat milk production. It contained questions on: management, commercialization, and potentials and constraints for introducing or increasing goat milk production. Twenty producers were interviewed.

The long questionnaire had 53 questions and was given to 23 producers. It had the same questions as the short form plus general questions on agricultural and livestock production, commercialization and constraints in farm production improvement. Copies of the questionnaires are included in Appendix 2.

In addition, eighteen producers who were asked to respond to either one of the above questionnaires were also asked about the conditions leading to the sale of any product, their sources of income, and the age and educational level of family members.

Personal interviews were selected as the primary research method for a number of reasons. Local farmers are usually illiterate, and therefore could not be given printed questionnaires. Also, since they are skeptic about survey in general, it was thought that personal interviewing would make them feel more comfortable and forthcoming. Information was also obtained from field notes and the census data concerning agricultural and livestock production.[5] The data that was obtained was analyzed both qualitatively and quantitatively.

Analytic Focus

The research was aimed at analyzing the following: (1) the characteristics of local peasant households; (2) the local peasant production system; (3) the social and economic role of goats within the total production system; (4) the level of technology utilized in goat production; and, (5) the constraints and potentials to increase goat production in general, and goat milk production in particular.

The households were categorized according to the composition of their members, the allocation of labor, sources of income, their use of outside wage labor, the size of the production limit, and the form of land ownership.

Local peasant production systems were identified according to: farmer's main production problems, the relations between crops and livestock and the relative importance of each for subsistence and/or for sale, the factors affecting levels of production, and the sources of change in production strategies.

Goat production was categorized in terms of the relationship between the number of goats and the size of the farm and, the infrastructural constraints to goat production. The relative importance of goat production in relation to sheep and cattle production was assessed according to the following factors: the producers' preferences regarding the various livestock, the allocation of land, labor, and capital, the adaptation of goat production to local ecological and social systems, and the incentives for goat production.

The level of technology utilized in goat production was assessed in terms of feeding systems, infrastructure, reproduction management and health management.

Production constraints and potentials for increasing goat, and goat milk production were evaluated in terms of the producers' attitudes towards exotic and native breeds, the importance of goats for household consumption and income generation, fluctuations in goat herd sizes, commercialization of goat and goat byproducts, and goat milk production, consumption and sale.

Footnotes

1. Municipios are local equivalents for counties.

2. Microregions are defined as "areas which occupy, within one state or territory, municipios with certain homogeneity of physical, social and economic characteristics" (Fundacao Instituto Brasileiro de Geografia e Estatistica, 1978:21).

   Distritos are geopolitical subdivisions of municipios, formed by its main villages and surrounding rural areas.

2. Yearly rainfall distribution in 1977 and 1978 for Soledade (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1977	90.0	3.5	9.3	133.6	148.3	40.9	68.1	4.5	9.0	0.0	2.1	1.0
1978	0.0	103.5	128.8	80.3	161.8	44.4	103.2	13.7	10.7	0.0	2.2	2.6

Year	Total	Average
1977	510.3	42.5
1978	653.2	54.4

3. Yearly rainfall distribution in 1977 and 1978 for Sao Joao de Cariri (mm)

Year	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
1977	51.3	0.0	45.0	348.8	55.4	40.0	67.0	0.0	0.0	0.0	2.1	1.0
1978	0.0	39.0	115.2	37.0	128.0	28.0	66.0	9.0	5.0	0.0	0.0	0.0

Year	Total	Average
1977	607.5	50.6
1978	427.2	35.6

4. Data concerning individual farms with goats and their location within the municipios were not available neither from the for Instituto Nacional de Colonizacao e Reforma Agraria, (INCRA), the Empresa De Assistencia Tecnica Extensao Rural (EMATER), nor from the Fundacao Instituto Brasileiro de Geografia e Estatistica (IBGE).

5. The main data source was the Fundacao Instituto Brasileiro de Geografia e Estatistica (IBGE).

RESEARCH FINDINGS

This section consists of: (1) an assessment of the general characteristics of peasant households in Soledade and Sao Joao do Cariri; (2) an analysis of the local production systems; (3) an analysis of goat production; (4) an assessment of the socio economic role of goats; (5) an identification of the levels of technology utilized in goat production; (6) an identification of those constraints and potentials for increasing goat production; and, (7) an overview of goat milk production, practices and possibilities to increase production.

1. Peasant Households

Land is the most important factor of production for these peasants, for land ownership constitutes the primary means they have to ensure family survival. Once peasants inherit or buy the land, they tend to keep it and to try to increase its size. A significant finding was that 39 percent of these peasants owned the land for thirty years or more and 26 percent for ten years or more, amounting to 65 percent of all farmers owning the land for 10 years or more.

All peasants in the sample were resident-owners of the land. Forty-three percent of the farms were obtained by inheritance, 30 percent by purchase, and 26 percent by both inheritance and purchase. Land ownership in this area, therefore, seems to be largely related to the previous generations' ability to own land.

The nuclear family is the main supplier of labor for crop and livestock production activities within peasant production units. The need for hiring wage labor varies according to household composition, cash availability, and levels of labor demand. We found, for instance, that

labor is rarely hired by those families which had teenager sons and daughters, whereas households with few adults (usually only the parents) very commonly hired wage labor both on a yearly and seasonal basis.

Women play multiple roles within production units, although household tasks are traditionally performed by females. The extent of their involvement in agriculture varies widely among households. It is mostly determined by the number of men in the household and their ability to supply labor throughout the year. Another factor conditioning the participation of women in agriculture is the age and number of children in the households. Small and numerous children increase the time devoted to childcare and reduce the time available for family. Although we saw women working in the field after the first rainfall, most informants members agreed that women should only go to the fields when there was not sufficient male labor.

Many wives reported that previously women worked more in agriculture than they do today. One explanation was that women now have more access to education and employment, and therefore they often go to school or work in the village. Some women, however, said they still plowed and weeded the fields in the rainy season. During the dry season, women and/or children were usually in charge of bringing home water. Such trips may take many kilometers and are made on foot. Women also usually feed newborn, weak, or lactating animals.

Child labor is an important part of household production strategies. They start working at the age of six or seven and there is no strict sexual division of labor among them. Girls, however, are expected to perform household tasks in addition to agricultural ones.

Many producers expressed the advantages of having large numbers of children. One producer who had five children aged a few months to eight

years old said that he looked forward to the time when his children would grow up so that he can stop hiring wage laborers.

As children grow older the sexual division of labor becomes sharper. Men tend to become involved exclusively in agricultural work whereas women, although contributing to farm activities in peak seasons, diversify their activities primarily into schooling and traditional female roles. Some of the women in the sample worked as sewers, crochet makers, etc.

Neither kinship nor friendship ties beyond the nuclear families provide significant reciprocal labor, as 91 percent of the producers do not use any kind of unpaid help. In the rest of the cases, the producers exchanged labor for land use of for products, as a means to deal with scarce factors of production and means of subsistence. In one situation, for instance, help received from the producer's brother for plowing the land, was traded for corn stover. In another case, the producer's son provided help in agricultural activities during the rainy season in exchange for living at his parents' farm.

Sixty-three percent of the peasants did hire wage labor whenever family labor was not sufficient to cope with the labor requirements of production activities. Wage labor was usually provided by other small landowners who had large families, as well as by landless families living in the larger farms. An important point to be made here is that it seems that there has been an increasing impoverishment and proletarianization of the rural population in the region. The proletarianization process, being characterized by the process which transforms the independent producer into a wage laborer, has been underway both by the loss of access to the means of production as well as by its continuing access to it under particular circumstances. This means, for instance, that the local producers have been partially able to keep their land while on the other

hand they have had to sell their labor force as a means to insure survival. Access to land, therefore, is not enough to insure peasant survival within the actual economic system.

The fact that such a large number of producers hire labor means that this strategy is utilized by producers of all sizes since 65 percent of the sample consisted of units of less than 50ha. The percentage of farms which hired labor did not differ significantly by size or category.

The main activities during the dry season are cutting wood, planting opuntia, and making fences. Fences serve to protect plots from animals, particularly goats. Very often the caatinga vegetation becomes too depleted due to lack of rain and/or to overgrazing. Under such circumstances, cutting and burning native cacti to feed animals, particularly the cattle, becomes an additional activity.

During the rainy season, the main activities consist of clearing and weeding plots, cleaning the livestock ponds and planting. The labor which is involved in livestock production during the dry season, such as cutting opuntia and algaroba, and cutting and burning native cactii is directed to crop production with the onset of the rainy season. Because local peasants were dependent on the market for the provision of many household items, peasants usually engaged in other activities which provided them with income. Thirty-nine percent of the men in the households in the sample were working in urban jobs and 22 percent of the women had some type of occupation. Twenty-two percent of the households also received some type of retirement income. Many producers also worked occasionally in the drought-relief program, receiving Cr$11,250 (approximately US$25 per month). This program is the only extra source of income for many families and involves male labor in dam building; until last year, women were also hired. Until 1982 the drought relief program was the means by

which land owners utilized the services of rural laborers paid by the government. These laborers made fences and adobe bricks, and cleared land and livestock ponds.

Sixty-four percent of the producers hired wage labor whenever it was necessary and they had the cash availability and the labor demand, whether during the dry or the rainy seasons, although not on a constant and regular basis. Twenty-nine percent did so in the rainy season only, whereas 7 percent only hired labor during the dry season.

2. Production System

Farms of all sizes employed similar production systems. The same crops were grown and the same kind of animals were raised in all farm units studied. The production systems constitute strategic responses to deal primarily with ecological constraints characterized by extended drought periods and are size neutral.

In the peasants' mixed agricultural system, different products satisfy different households needs. The relatively higher importance of livestock as compared to crops as the most important sources of income are due to the high levels of weather variability, which makes crop production more vulnerable. Crops' importance, however, cannot be ignored because grains, for example, are the main staple in the household diet. Corn and bean harvests might not be sold for years if their supply is not enough for the household's needs. Livestock production, on the other hand, is a year-round activity as animals are born throughout the year and they can therefore be disposed more often.

Livestock was considered the single most important source of income by 39 percent of the producers. Crops were the most important source of income for 23 percent of the producers, while, the rest regarded crops and

livestock as equally important. Livestock importance is greather during the dry season, and agriculture's importance is greather during the rainy season. (Table 1)

Table 1

Most Important Sources of Income for Producers

Source of Income	Number of Producers	Percentage of Producers
Livestock	7	39
Crops	4	23
Livestock and crops	6	33
Not applicable	1	5
Total	18	100

Crop production strategies can be altered in different years depending on the available rainfall. Thus, some crops may not be planted due to insufficient rainfall. Similarly, the timing of the production cycle can also vary between years. Allowing for these variations, it is still possible to project an average agricultural calendar for the region. (Tables 2 and 3)

Table 2

Crop Production Calendar for Sao Joao do Cariri

Crop	Soil Preparation	Planting	Weeding	Harvesting	Marketing
Cotton	Jan/Feb	March/April	April/May	Aug/Sept	Sept/Dec
Corn	Jan/Feb	March/April	April/May	Aug/Sept	Oct/Dec
Beans	Jan/Feb	March/April	April/May	Aug/Sept	Oct/Dec

Source: EMATER, 1979a

Table 3

Crop Production Calendar for Soledade

Crop	Soil Preparation	Planting	Weeding	Harvesting	Marketing
Cotton	Feb/March	March	March/May	Aug/Nov	Sept/Dec
Corn	Feb/March	March	March/May	June/Sept	June/Oct
Beans	Feb/March	March	March/May	June/Aug	July/Oct

Source: EMATER, 1979b

Crop production activities are mostly concentrated in the rainy season, with the exception of the marketing phase. In this regard, crop production is well integrated with livestock production. Livestock's nutritional needs during the rainy season are met by free grazing in the open caatinga. By the same token, the livestock's nutritional needs during the dry season are partially met by grazing on crop residues. Within the current extensive management systems, there do not seem to exist major labor input conflicts between crop and livestock production.

2a. Agricultural Activities and Market Interaction

Peasant production in this area is characterized by a variety of crop and livestock activities. They include at least three different kinds of large and small types of livestock and several types of crops which are intercropped as well as monocropped. Most of the crops and livestock take either a subsistence or a cash function in response to ecological and economic conditions and to the subsistence needs of the household. In other words, the peasants' primary production goal is to feed their family and animals. Therefore, the local peasants will not sell their products unless their yearly subsistence needs are first secured. Exceptions are made to this rule, however, in those situations when there is no other alternative in solving some critical problem (such as a family member's disease) than selling part of the amount of products normally saved for household consumption (corn, beans) or for such abnormal situations (goats, pigs, cattle).

Cotton is the only crop produced exclusively for the market. Livestock may also be marketed. They are raised as a means for providing for household income which will be used to subsidize other farm activities and household needs. The selling of livestock, however, should be analyzed as a very particular form of market interaction. The main reason for this particularity is that livestock is not sold on regular schedules or in regular quantities. Instead, the timing and number of animals sold depend on the household needs for cash which will be used, for instance, to buy seeds, feed for some animals, medicines needed for the family, or to pay for hospital bills or schooling, etc. For these reasons, peasants cannot be viewed as exclusively subsistence or market oriented, even though household subsistence is their ultimate goal.

2b. Crop Production

Soledade and Sao Joao do Cariri basically produce the same crops and livestock. Combining the two areas, it was found that corn, beans, and cotton are by far the most common agricultural crops grown. Intercropped corn and beans are grown by 57 percent of the informants. Forty-eight percent of these producers grow corn and beans combined with cotton in the same plot. Monocropped opuntia is grown by 70 percent of the producers, while cotton, as a single crop, is grown by 35 percent. Opuntia is sometimes intercropped with corn or with corn and beans; these are eradicated after the second year that opuntia is planted. (Table 4)

Cotton was never grown as a single crop in Sao Joao do Cariri for it had been practically eradicated for the last three years. Some cotton is, however, still intercropped with corn and beans among 44 percent of the producers. The reason for the decline of cotton production is that recurrent droughts over the last three years led producers to graze livestock in the cotton fields. The effect of the extended drought also led producers to stop selling corn, which is used both for family and animal consumption. This is relevant in terms of assessing the relatively higher importance of livestock as compared to crops during drought periods.

Corn and beans are main food staples of the local rural population. As such, neither is sold unless the yearly amount needed by the household is first secured and stored. Very often producers store more than the yearly family needs for staple, as a precaucion against low rainfall.

One difference between the two municipios is that in Soledade there is a tendency for peasants to sell more corn than beans. In Sao Joao do Cariri, however, even though both corn and beans are seldom sold, beans

Table 4

Crop Production in Soledade and Sao Joao do Cariri

Crops	Soledade N = 14 Frequency	Soledade N = 14 Percent	Sao Joao do Cariri N = 9 Frequency	Sao Joao do Cariri N = 9 Percent	Total N = 23 Frequency	Total N = 23 Percent
Multiple cropping						
Corn and beans	7	50	6	66	13	57
Corn, beans, cotton	7	50	4	44	11	48
Corn, opuntia, beans and/or cotton	4	29	-	--	4	17
Corn, algaroba, beans and/or cotton	1	7	-	--	1	4
Monocropping						
Opuntia	9	64	7	77	16	70
Napier grass	2	14	-	--	2	9
Cotton	8	57	-	--	8	35
Algaroba	-	--	1	11	1	4
None	-	--	2	22	2	9

are sold more often than corn. For 70 percent of the peasants interviewed, cotton was the main cash crop. (Table 5)

Cotton is usually sold to middlemen who take it to plants located in the northeast or in southern Brazil. Cotton is usually sold immediately after harvesting, independently of its market price. The reason is that during the dry season, or at the beginning of the rainy season, most producers obtain loans from rich farmers or from middlemen, which must be repaid at harvest time, at the end of the rainy season or beginning of the dry season. Cotton, therefore, is a quite secure source of income which will be channeled to the payment on informal and unofficial bases from larger farmers, bulkers or intermediaires, since small producers in

Table 5

Main Crops Sold in Soledade and Sao Joao do Cariri

Crops	Soledade N = 14 Frequency	Percent	Sao Joao do Cariri N = 9 Frequency	Percent	Total N = 23 Frequency	Percent
Cotton	13	93	3	33	16	70
Corn	2	14	-	--	2	9
Beans	-	--	4	44	4	17
Corn, beans	9	64	-	--	9	39
Not applicable	1	7	2	22	3	13

Northeast Brazil have practically no chances in obtaining credit facilities from banks.

One-hundred percent of all corn and beans produced in Soledade are marketed within the municipio (Empresa de Assistencia Tecnical Extensao Rural da Paraiba, 1979). Because corn and beans productivity levels are low, and because they are the main staples for the local population, we assume that the relatively small amount of these products which gets to the market is consumed within Soledade and its neighboring municipios' population.

Although corn and beans are sometimes also sold when unexpected needs for cash occur, a situation which demonstrates the need for the maintenance of diversified, multi-crop production systems in the region such needs are mainly met by the sale of animals. One producer, for instance, reported that he had recently sold fifteen of his 45 goats in order to pay for his wife's surgery. Most peasants avoid selling corn and beans because market prices for these two crops vary enormously, according to the seasons of the year, the yearly rainfall, and consequently the levels of supply. One producer said that he recently sold some beans

because he needed cash, and as the drought persisted, he could not plant beans and therefore he later had to buy beans in the market in order to provide for home consumption. He ended up paying much more than he was paid when he sold his beans. The peasant's need to meet household demands throughout the year and their poor ability to do so, forces them to sell their crops immediately after harvesting, instead of waiting until prices rise.

2c. Trends and Potentials to Increase Crop Production

Eighty-seven percent of the peasant producers said they would not specialize in any particular commodity. Crops provide for household subsistence (corn and beans), animal feed (corn, corn stover, crop residues, opuntia, algaroba), and income (cotton, and occasionally corn and/or beans). Livestock also provides for household subsistence (poultry, swine, and occasionally sheep and goats). However, the livestock's main importance is that it can be sold throughout the year, whenever necessary. Crops only generate income once a year.

Although producers in the more developed municipio of Soledade would rather increase both subsistence and cash production, producers in the poorer and drier Sao Joao do Cariri would rather increase subsistence crop production. In general, 40 percent of all producers prefer to increase subsistence production over cash production. Only 26 prefer cash production over subsistence production. Thirty percent of the producers would like to increase equally subsistence and cash crop production. (Table 6) The implications of such preferences for a potential increase in goat production might be that producers in Soledade will more likely engage in commercial production than those in Sao Joao do Cariri.

Table 6

Producers' Production and Marketing Strategies in Soledade and Sao Joao do Cariri

Production & Marketing Strategies Preferred	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Increase production of:						
Subsistence crops	4	29	5	56	9	40
Cash crops	3	21	3	33	6	26
Both of the above	6	43	-	--	7	30
None of the above	1	7	1	11	1	4
Total	14	100	9	100	23	100
Increase production of crops with:						
Best market price	13	93	5	56	18	79
Less labor demand	1	7	3	33	4	17
Not applicable	--	--	1	11	1	4
Total	14	100	9	100	23	100

Peasants in the research site occupy lands which are highly susceptible to droughts; therefore, production strategies concentrate on production lines which have proven to be the most drought resistant. Because peasants live on very limited incomes, they cannot afford raising or growing products which require substantial capital inputs, since this might represent a loss in their ability to provide for household subsistence in times of need. The peasants' lack of access to capital, to

infrastructure, and to new technologies mean that improvements in production strategies have to be cognizant of these handicaps.

The determining factors for actual increases in production and subsequent greater market integration among these producers seem to be related to the municipios' infrastructural facilities (water sources, transportation and marketing), ecological conditions, and household needs and access to land, water, labor, and capital, rather than to market demand. However, when producers were hypothetically given a choice between increasing production of crops which involved less labor or increasing production of crops which had higher market prices, 79 percent of them preferred the latter. Producers in Soledade were almost unanimous, 93 percent, in their willingness to increase production of crops with better market prices. On the other hand, Sao Joao do Cariri's less developed marketing systems and infrastructure led the local producers to have a more evenly divided opinion, whereby 53 percent preferred higher market price crops while 33 percent opted for less labor intensive crops. (Table 6)

As credit becomes more available for planting opuntia and algaroba, they become increasingly important as sources of forage for use during the dry season. Opuntia has also become a source of income for peasants living in this microregion; it is sold to cattle producers in the more arid regions of the state.

The state has emphasized substituting sorghum for corn as a means of improving animal production. Incentives such as free seeds, have been freely distributed in some municipios, including Sao Joao do Cariri, even though the potential for adoption of this new crop is still unknown. However, chances are that not many peasants will rapidly adopt it, since they already seem to have enough problems in allocating land for their

traditional crops. Besides, the marketing of sorghum would require marketing cooperative enterprises or industries which they can count on. Furthermore, since sorghum is not part of the local diet, it could displace a staple crop and this might prove a negative step. This potential harm, however, might be offset by the potential increases in livestock production. A similar kind of concern exists towards opuntia and algaroba production.

2d. Livestock Production

Livestock production is as diversified as crop production. Livestock diversification always involves goat production, an element common to most production systems in the region. Forty-eight percent of all producers raise cattle, sheep and goats; 26 percent raise cattle and goats; and another 26 percent raise only goats. (Table 7) Poultry and swine are raised in virtually all production units. They are the main sources of household animal protein (eggs, meat), and also contribute to the household income. Larger animals such as sheep, goats and cattle, on the other hand, are important sources of income rather than sources of subsistence. The relatively higher importance attached to livestock development in general, as compared to crop production, is shown in Table 8.

At this point, a few remarks are necessary. First, the local peasantry is primarily interested in insuring subsistence. This is done by cultivating crops which constitute their basic diet, particularly corn and beans, besides eggs. Eggs are the main source of animal protein for the poor peasants, who can't afford buying meat or killing animals for home consumption. In fact, consuming meat which could be transformed

Table 7
Livestock Production in Soledade and Sao Joao do Cariri

	Soledade		Sao Joao do Cariri		Total	
Livestock	Frequency	Percent	Frequency	Percent	Frequency	Percent
Cattle, sheep goats	7	50	4	44	11	48
Cattle, goats	4	29	2	22	6	26
Goats	3	21	3	33	6	26

Table 8

Producers' Preference to Increase Livestock and/or Crop Production in Soledade and Sao Joao do Cariri

	Soledade		Sao Joao do Cariri		Total	
Preferred Products	Frequency	Percent	Frequency	Percent	Frequency	Percent
Livestock	7	50	5	56	12	52
Crops	5	36	3	33	8	35
Livestock, Crops	1	7	1	11	2	9
None of the above	1	7	-	--	1	4

into cash is considered a luxury.

Secondly, the peasants are well aware that they live in a market economy and that, as such, they have to develop strategies which fulfill their role as exchangers of commodities. It is, therefore, within this context that we have to understand the fact that 52 percent of the producers said they would like to increase livestock (e.g., cash crop) production instead of crop production. Furthermore, this is understandable because, as we will discuss ahead, they are willing to

increase goat production particularly. Goats, as we know, represent the easiest and cheapest animal to raise. This, in turn, reinforces our view that the local peasantry is willing to increase production of crops which have the least climatic and financial risk and the least capital investments.

3. Goat Production

Goats were raised in all the farms studied. The number of animals per farm ranged from seven to two-hundred. A very interesting aspect of goat raising was that the size of herds was not related to farm size. Both the smallest and the largest herds were found within the less than 50ha farm category. By the same token, one of the smallest goat herds was located within the 101-150ha farm size category. (Table 9)

The number of goats in any given production unit was largely determined by three factors: topography, size of surrounding farms and extent of fencing. According to informants, the mountains ('serras') are the most appropriate sites for goat production, whereas the flat lands ('tabuleiros') are better for sheep. Areas where small farms are concentrated tended to have fewer goats than those areas in which small, medium and large farms co-exist. This is largely explained by the fact that in areas where small farms predominate, herds are in greater proximity to crop areas and common grazing areas are small or non-existent. This situation leads to constant goat trespassing on crop areas and constant conflict. The most common solution to such problems is to reduce the number of goats per farm unit, since goat confinement is not a common practice.

Table 9

Number of Goats per Production Unit, According to Farm Size Categories in Soledade and Sao Joao do Cariri

Number of Goats and Farm Size Categories	Number of Production Units		
	Soledade	Sao Joao do Cariri	Total
50ha or less			
- 20 goats or less	4	1	5
- 21 to 40 goats	4	2	6
- more than 41 goats	1	4	5
Total	9	7	16
Range	7-200 goats	20-80 goats	7-200 goats
51 to 100ha			
- 21 to 40 goats	2	-	2
- more than 41 goats	1	1	2
Total	3	1	4
Range	20-50 goats	(120 goats)	20-50 goats
101 to 150ha			
- 100 goats or less	1	1	2
- 101 to 150 goats	1	-	1
Total	2	1	3
Range	10C-150 goats	(10 goats)	10-150 goats

On the other hand, areas where farms had been fenced also tended to have fewer goats than those where everyone's land was open for grazing. One producer, commenting upon the fact that large farms were being increasingly fenced, said that "in the future, the only ones to raise goats will be the large farmers." This is a very important issue to be taken into account by research and extension agents. Intensification of

goat production requires at least that goats are confined or semi-confined. Confinement, on the other hand, requires capital availability for fencing, building paddocks, buying supplemental feeding, etc. As such, increasing goat production will be possible only to the extent that one has abundant land and/or capital. Therefore the poor would be excluded. A reinforcing aspect of such process is the fact that fencing by some producers means less common land available for most goat producers.

The high importance attached to goats can be assessed by the fact that among all livestock raised, improving the quality of the goat herd, particularly through improvements in health and nutrition, was considered of primary importance by 56 percent of the producers. Improving both the goat and the sheep herds was most important for 35 percent of the producers.

Forty-three percent of the producers would like to increase the number of goats, compared to 26 percent who would like to increase the number of both sheep and goats. (Table 10)

Table 10

Producers' Preference to Increase Herd Size in Soledade and Sao Joao do Cariri

Preferred Livestock	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Goats	5	35	5	56	10	43
Sheep, goats	4	29	2	22	6	26
Cattle, goats	2	14	-	--	2	9
Cattle	2	14	-	--	2	9
None of the above	-	--	2	22	2	9
Not applicable	1	7	-	--	1	4

More producers in Sao Joao do Cariri were willing to increase goat herd size than in Soledade: 56 and 35 percent, respectively. On the one hand, this may be explained by Sao Joao do Cariris' water scarcity, which makes it difficult to raise sheep and cattle, animals that require more water and forage than goats. This may also be explained by the fact that these producers do not consider land as a scarce resource. In addition, many producers in this municipio mentioned that goats are inherently made to browse in the caatinga, and they will not adapt to intensive management techniques.

Successful diffusion of innovation in this area requires that the producers' preferences be taken into account. The preference for improving and increasing the size of goat herds instead of the size of other livestock herds can be partly explained by the fact that 74 percent of all producers agreed that goats were the easiest animals to raise. Cattle, were not only considered to be the most difficult animal to raise, 78 percent, but were also the animal that requires more labor, land, and capital. (Table 11)

4. Socio-economic role of goats

Goats, traditionally, are crucial elements of the local production systems. Some peasants hold strong beliefs concerning goats. For instance, one producer said that he did not treat them for diseases because "goats are strong by nature." Another said he would not build any facilities because "goats are to be raised free in the caatinga, and

Table 11

Comparative Advantages and Disadvantages Among Different Kinds of Livestock

Livestock	Easiest to Produce		Most Difficult to Produce		Requires Most Labor		Requires Most Land		Requires Most Capital	
	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent	Frequency	Percent
Goats	17	74	1	4	-	-	4	17	-	-
Sheep	-	-	1	4	-	-	1	4	-	-
Cattle	-	-	18	78	19	83	9	39	20	87
Sheep, Goats	4	18	1	4	-	-	5	22	-	-
Sheep, Cattle	-	-	2	9	3	13	2	9	3	13
Cattle, Goats	1	4	-	-	-	-	2	9	-	-
Not Applicable	1	4	-	-	1	4	-	-	-	-
Total	23	100	23	100	23	100	23	100	23	100

they acquire and transmit diseases when confined." Still another producer said that he would rather take sick goats to a healer rather than give them medicines.

Peasants usually give more than one reason for raising goats. Seventy-four percent said they were easy to raise; 61 percent said they were easy to sell; 30 percent said they utilized less labor; 26 percent said they required no expenses and another 26 percent said they were important for household consumption; 22 percent said that since they are only sold for cash, the producer can obtain money immediately from their sale. (Table 12)

Table 12

Main Reasons for Raising Goats (N=43)

Reasons	Frequency	Percentage
Easy to raise	32	74
Easy to sell	26	61
Little labor	13	30
No expenses	11	26
Household consumption	11	26
Cash received immediately after sale	9	22

Producers considered goats easy and inexpensive to raise, as well as requiring low labor inputs. As one producer pointed out, "instead of raising 10 cows I raise 50 goats"; still another said "the costs of raising 2 to 3 cows is the same as that of raising 20 to 30 goats." Another producer recalled the old saying that "goats are the poormen's cattle." Another reason for preferring goats instead of cattle is the shorter gestation period of goats, compared to that of cattle. One producer said that the amount obtained through the sale of goats

constituted profit. Cattle, on the other hand, "are sold by half the amount spent in raising them." One producer said that cattle should not be raised at all in the Cariris Velhos microregion: "only goats can survive because they do so without any cost for the producer since they eat anything."

Goats are primarily a source of income rather than an important subsistence product. They are a kind of "...self-renewing resource, periodically harvested for the maintenance of the household." (Primov, 1982:43). This partly explains the fact that producers would rather buy goat meat in the market instead of slaughtering their own animals. This is mostly due to the fact that slaughtering a medium-sized animal such as a goat for home consumption (except in special occasions) would mean sacrificing the cash income which could be obtained by the sale of the live goat. Thirty percent of all producers did not slaughter any goats for home consumption. Forty percent slaughtered an average of only one to five goats per year. Therefore, 70 percent of all

Table 13

Number of Goats Slaughtered per Year per Household for Home Consumption in Soledade and Sao Joao do Cariri

Number of Goats	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None	5	36	2	22	7	30
Slaughtered	9	74	7	78	16	70
1-5	6	43	3	34	9	40
6-10	-	--	1	11	1	4
11-20	2	14	2	22	4	17
21-30	1	7	1	11	2	9
Total	14	100	9	100	23	100

producers interviewed would rarely slaughter goats for home consumption; once again, goats here are cash products. (Table 13)

Thirty-four percent of the producers sell an average of one to ten goats per year. A substantial number of producers, 22 percent, was not able to tell how many goats were sold. (Table 14) This is due to the fact that household cash needs vary significantly between years, leading to different levels of animal sales. Some of the cash needs reported were for: rations for the sheep and cattle, wages for laborers, payment of bank loans and family members' health care. Goats were sold whenever relatively small amounts of money were needed; cattle, on the other hand, was sold when large amounts were needed.

Table 14

Number of Live Goats Sold per Year per Household in Soledade and Sao Joao do Cariri

Number of Goats sold	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
None	1	7	1	11	2	10
1-10	6	44	2	22	8	34
11-20	-	-	2	22	2	10
21-30	1	7	1	11	2	10
31-50	1	7	-	--	1	4
51 or more	2	14	-	--	2	10
Do not know	2	14	3	33	5	22
Not applicable	1	7	-	--	1	4
Total	14	100	9	100	23	100

Producers never slaughter their animals and retail the meat. Goats for sale are sold live either to bulkers who buy the animals at the farm, 48 percent, or in village markets, 30 percent. (Table 15)

Table 15

Live Goats Sold to Bulkers and in Village Markets per Household in Soledade and Sao Joao do Cariri

Live Goats Sold	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Bulkers	3	21	8	89	11	48
Village markets	7	51	-	--	7	30
Both of the above	2	14	-	--	2	9
Not applicable	2	14	1	11	3	13
Total	14	100	9	100	23	100

Bulkers receive an average 20 percent profit for each goat bought at the farm and sold in a market. Village markets are held weekly in the most important villages within the municipios. Village markets follow a pattern of rotation between the neighboring municipios which allows the producers to sell their animals and other products any day of the week, in various neighboring locations. Such rotation pattern, however, is not always followed by the local peasants. The main reasons are: a) some markets are too small to provide some certainty that products will be sold; b) poor infrastructure, particularly as related to roads, which often become flooded during the wet season. Goats produced in Sao Joao do Cariri are usually sold in the market of Serra Branca, whereas those produced in Soledade are sold in Soledade itself.

The higher dependency of Sao Joao's producers on bulkers, 89 percent as compared to 21 percent in Soledade, is a good indicator both of their lower direct access to markets and of the municipio's poorer infrastructure. This means that these producers might be selling their goats for a lower price than producers in Soledade, since part of the profit is accrued to the bulkers, who must pay for transportation expenses

and still make a profit. This may lead to a lower incentive for producers in Sao Joao do Cariri to increase goat production.

Goats are valued according to their weight. Therefore, when producers are asked about the best time for selling these animals, they replied that it is during the rainy season since the animals weigh more and there are more buyers willing to purchase goats. On the other hand, the value of goats decreases during the dry season because they weigh less. Although he receives more cash per animal because it weighs more, he makes a worse deal at this time of the year, as the kilogram price is lower.

Goat hides are another source of income for households. Sixty-three percent of all producers sell the hides of goats slaughtered for home consumption. In 95 percent of the cases sales are made at village markets. Bulkers resell the hides to urban merchants concentrated in two regional centers, Caruaru and Campina Grande. These merchants either take the hides to local manufacturing plants, or to other merchants from the national and international markets. This stratum of the rural population was not at all involved in leather handcrafts, even though the Northeast is a significant leather manufacturer. It exports leather purses, hats, clothes, shoes and other products to other parts of Brazil as well as to other countries.

Very often the producers sell the hides to the same intermediaries to whom the live animals are sold. These intermediaries are the ones to retail the hides and to set their price at the production unit level. Even though the number of hides sold by the local producers is almost insignificant due to the fact that animals are sold live, it seems that the local population is interested in the development of rural industries which process leather. These industries would create jobs and should necessarily establish some kind of storage and/or processing goat meat if

there was to be a significant increase in leather supply by the direct producers.

Prices vary according to how the hides are dressed and cured, and to the levels of supply. Prices are usually lower during the rainy season, when more goats are killed both for home consumption and sale. One producer pointed out that hides decreased from Cr$ 500-600 in November, 1982 to Cr$ 350 in February, 1983. This same producer blamed price declines on both intermediaries and warehouses which, according to him, usually stockpiled hides in order to decrease the amount paid to producers.

5. Level of Technology in Goat Production

The management system utilized in goat production is land extensive. For instance, 70 percent of all the herds browsed free in the caatinga of neighboring farms, a management practice which seems to be fairly common in the area. Fifty-two percent of the herds are grazed on both native vegetation and on crop residues; 39 percent grazed only on native vegetation; and 9 percent also grazed on cultivated pastures, usually napier grass. (Table 16) Crop residue grazing is limited to the dry months, and is avoided in the cotton fields. The reason is that corn and beans have to be planted annually, whereas the cotton is a perennial crop. Some producers take their animals to the more humid valleys during drought periods.

The producers' high level of market relations independence can be assessed by the fact that supplemental feeding mainly involves those forages which are available at the farm. The only exception is

cottonseed meal, which was bought by 17 percent of the sample. (Table 16) Cottonseed meal, however, is mainly given to cattle, and the amount given to goats is almost insignificant.

Supplemental rations are given to the goats depending on their availability at the farm level (e.g., for free) and the condition of the goat. (Table 16) Kids and lactating does are given preference for supplemental feeding. Sixty-one percent of the producers gave corn to their goats, 39 percent gave corn straw, 30 percent gave opuntia, and 22 percent gave algaroba. Aveloz, a tree which is only palatable to goats, was given as supplementary feeding by 9 percent of the producers. Cacti have a low nutritional value, but high water content. Algaroba, on the other hand, is rich in proteins and carbohydrates. Even though only 4 percent reported giving goats native cacti, we suspect that probably all producers adopt this practice during drought periods. The reason for this suspicion is that native cacti are important elements of goat nutrition during the dry season. Furthermore, producers are aware of its value in maintaining animals during extended periods of drought. However, we believe that producers feel somewhat uncomfortable reporting such a "primitive" strategy to us.

Herd health conditions are poor. Basic prophylactic measures are rarely taken. For instance, only 43 percent of the producers deworm their goats while 39 percent claimed to have vaccinated their goats. Even though these percentages might seem somewhat high if we consider the poor conditions under which these peasants live, they will seem quite low and even insignificant when we add that prophylatic measures were taken rarely. For instance, deworming might be done once in the last five or ten years. That is, prophylactic measures are not taken on a continuous basis. This, in turn, is a consequence of poverty and low levels of technical assistance and knowledge.

The main health problems identified were Caseous lynphadenitis, present in 78 percent of all goat herds, worms, present in 48 percent; and ticks, in 22 percent of the herds. (Table 16) It has been shown that the incidence of Caseous lynphadenities decreases with better feeding, better facilities, good hygenic conditions, deworming and culling of sick animals (dos Santos, 1977:13).

These figures data on goat diseases do not differ significantly from those compiled by the Universidade Federal da Paraiba and the Kellogg Foundation (1980) in the neighboring municipio of Pocinhos. There, 98 percent of the herds had worms; 79.8 percent had Caseous lynphadenitis; and, 39.4 percent had ticks. The producers' limited technical knowledge and their tendency to generalize or misdiagnose diseases implies that some error exists in the data, but the figures do indicate the relative frequencies of diseases.

Reproduction control techniques, as well as other management practices, are intended to save labor and capital. No breeding control is performed. When the rainy season begins, the goats breed in the caatinga. The most often adopted management techniques are: the separation of pregnant and lactating does from the herd in 74 percent of the cases; and the separation of newborn kids until they are able to be on their own in the caatinga, 61 percent. (Table 16)

An idea of the impact of traditional goat production systems on goat productivity might be assessed from the data compiled in a two-year experiment conducted with the SRD goats, through a simulation of producers' management practices recorded the actual reproduction conditions in the field. Simplicio et al (1982:349) found that overall fertility was 78.5 percent, and that the overall rate of abortion was 24.7 percent. Of 85 kiddings, 54.1 percent were single births and 37.6 percent were twins. Neonate mortality rates for single birth kiddings

amounted to 60.9 percent, and 71.9 percent for twins, while all triple birth kids died. Another finding was that 68.1 percent of the 113 kids born during the experiment died before being weaned.

Facilities for goat production consist of roughly built paddocks, which do not have weather protection. Fifty-six percent of the peasants confined goats in the evenings, whereas 44 percent did not confine their goats at all. Some producers reported that they might not see their goats for days or weeks during the rainy season. During the dry season, however, it is common for goats to return to the farm late in the afternoon, in search for water. Confining livestock is a means to prevent theft, as well as loss from predators. It is not considered a technique for improving goat health conditions. In fact, many producers say that goat confinement leads to the spread of diseases and subsequent worse conditions of the herds. (Table 16)

Animal diseases were reported as the major problem by 77 percent of the goat producers; the second problem reported was goat trespassing on neighboring farms plots (62 percent); while the third was goat malnutrition (23 percent). Many producers reported that their goats had no problems. However, it is very probable that this opinion is unrealistic and merely reflects the feeling of most producers that goats are very hardy and do not require extra assistance or care.

6. Constraints and Potentials for Increasing Goat Production

As a means for assessing the constraints and potentials to increase goat production, producers were asked about their attitudes and the possibilities of increasing goat production by introducing improved goats

Table 16

Goat Management Techniques in Soledade and Sao Joao do Cariri

= 23	Soledade N = 14		Sao Joao do Cariri N = 9		Total N	
Management Techniques	Frequency	Percent	Frequency	Percent	Frequency	Percent
Grazing						
Neighboring farms	10	71	6	67	16	70
Native vegetation	7	50	2	22	9	39
Native vegetation, crop residues	7	50	5	55	12	52
Native vegetation, crop residues cultivated pasture	-	-	2	22	2	9
Supplemental Feeding						
Corn	9	64	5	55	14	61
Corn straw	8	57	1	11	9	39
Opuntia	6	43	1	11	7	30
Algaroba	-	-	5	55	5	22
Cottonseed meal	2	14	2	22	4	17
Aveloz	-	-	2	22	2	9
Burned native vegetation	-	-	1	11	1	4
No supplementation	1	7	1	11	2	9
Reproduction						
Separation of does for:						
Milking	2	14	1	11	3	13
Kidding	8	57	9	99	17	74
Separation of kids	9	64	5	55	14	61

Table 16 (continued)

Goat Management Techniques in Soledade and Sao Joao do Cariri

Management Techniques	Soledade N = 14 Frequency	Percent	Sao Joao do Cariri N = 9 Frequency	Percent	Total N = 23 Frequency	Percent
Health						
Health prophylaxy						
Deworming	7	50	3	32	10	43
Vaccination	5	36	4	43	9	39
Main diseases						
C. Lynphadenitis	10	71	8	88	18	78
Worms	4	29	7	77	11	48
Ticks	2	14	3	33	5	22
	N = 25		N = 18		N = 43	
Confinement						
None	11	44	8	44	19	44
At night	14	56	10	56	24	56

as a management technique. Fifty-seven percent said that it is difficult to raise improved goats. The other producers, 43 percent, said that it is not difficult but they pointed out that purebred goats could not do well under semi-arid conditions, whereas mixed breds probably could. Among these latter producers, 65 percent said that they would like to have improved goats and would adopt new management practices to raise these goats, if such wouldn't involve capital investment. Those who were not willing to do so, said that improved goats would require too much work and expenses. (Table 17) This suggests that they do want to improve the quality of their herds, but will rarely be able to do so due to economic constraints.

Table 17

Producers' Attitudes Towards Increasing Goat Production

	Soledade		Sao Joao do Cariri		Total	
Attitudes	Frequency	Percent	Frequency	Percent	Frequency	Percent
It is difficult to raise improved goats	7	50	6	67	13	57
It is not difficult to raise improved goats	7	50	3	33	10	43
Would accept improved goats	8	57	7	78	15	65
Would not accept improved goats	5	36	2	22	7	30
Not applicable	1	7	-	--	1	4

The fact that only 22 percent of the Sao Joao producers would raise improved goats even if they were lent to them shows the difficulty that extension agents may have in trying to modify the traditional production system under present conditions.

Besides the constraints faced by peasants, which have been worsened by the extended drought period of 5 years, forty-three percent of the goat herds had increased during the last year whereas 39 percent had decreased and the other 13 percent remained stable. Increases in herd size were due, in 70 percent of the cases, to natural increases. This is important data, for it shows that in spite of the high importance of goats in satisfying cash needs, producers barely invest any money in such crop. In the rest of the herds that increased in size, the increase was due to a combination of natural increase and purchases. Of the herds that decreased in size, 33 percent were caused by sales, 56 percent by animal deaths and 11 percent by both sales and deaths. (Table 18)

Significant differences in the goat herd size fluctuations were found between both municipios. In Sao Joao do Cariri, all herd decreases were due to mortality, whereas in Soledade these causes accounted for only 20 percent of the total. On the other hand, producers in Sao Joao do Cariri did not buy goats whereas in Soledade goat purchase plus births accounted for 43 percent of the increases in herd size. Low levels of goat purchases in Sao Joao do Cariri is explained by the fact that the

Table 18

Goat Herd Size Fluctuations During the Last Year per Household Unit in Soledade and Sao Joao do Cariri

	Soledade		Sao Joao do Cariri		Total	
Goat Herd	Frequency	Percent	Frequency	Percent	Frequency	Percent
Increased	7	50	3	33	10	43
Birth	4	57	3	33	7	70
Birth, purchase	3	43	-	--	3	30
Decreased	5	36	4	44	9	39
Sale	3	60	-	--	3	33
Sale, mortality	1	20	-	--	1	11
Mortality	1	20	4	100	5	56
Maintained same size	2	14	1	11	3	13
Not applicable	-	--	1	11	1	4

municipio does not have a village market large enough to sell these animals, and the costs involved in purchasing them in other municipios might be too high for most producers.

A crucial factor in determining the potential for increasing goat production in this area is the level of demand for goats and goat byproducts. Both this research and Primov's (1982) found that there is a constant market demand for goats throughout the year, which is a good incentive for increasing production and productivity. However, goat offtakes are usually low, below 20 percent. For Shelton and Figueiredo (1982:260) such a low offtake is due to socio-economic constraints among peasant producers. One of the main issues which must be resolved when attempting to increase production is how to combine the cost of higher labor and technology investments needed to raise the offtake with the low

prices of goats and goat byproducts which were identified at the time of the research. In other words, there is no reason to try to raise productivity if, under the high market demand situation at the present time, goats and goat byproducts' prices are already low.

7. Goat Milk Production

Goat production in general, and particularly goat milk production, are highly influenced by rainfall and forage availability. Years of high rainfall contribute to higher ground cover availability for goat grazing, as well as for better crop harvests. Income obtained from the sale of crops is sometimes used to buy rations for the livestock, mainly for the cattle and sheep.

Forty-eight percent of the producers believed that it was more profitable to raise goats for meat, compared to 39 percent who believed it was more profitable to produce dairy goats. (Table 19) An interesting observation was made by one producer, who said that it was more profitable to raise goats for milk because "one sells the goat twice: once for milk and cheese and once for the meat".

Most of the local producers do not milk their goats. Forty percent of them milk their goats mostly during the rainy seasons. Seventy percent of the producers said that the milk is not enough for the kids or the household. Often, milk was hardly enough for the kids. Therefore, the adoption of new technology would not yield a profit until kid and home consumption requirements are met. As one producer said, "for a dairy goat to be profitable it must produce at least 1 liter of milk per day, so that the kids have enough to grow up, and my family can drink part of what is produced."

Table 19

Producers' Attitudes Towards the Highest Profitability of Goat Meat Compared to that of Goat Milk

	Soledade		Sao Joao do Cariri		Total	
Attitudes	Frequency	Percent	Frequency	Percent	Frequency	Percent
Meat	6	43	5	56	11	48
Milk	6	43	3	33	9	39
Meat, milk	1	7	1	11	2	9
Not applicable	1	7	-	--	1	4
Total	14	100	9	100	23	100

Among all 43 households, milking was an activity that was performed by all members of the household: wives, 28 percent; husbands, 21 percent; and children, 14 percent. In some households this activity was performed by husbands and wives alike, 14 percent; husbands and children, 10 pecent; or wives and children, 10 percent. Women predominated on two aspects of goat milk production: in the care of lactating does and their kids, and in making cheese. Decision-making concerning the purchase, care, and sale of goats or their byproducts were made by the husbands in 70 percent of the households. It appears that the household is capable of absorbing the increased labor inputs associated with increased milk and cheese production.

Most producers said they would like to increase goat milk production, particularly for home consumption. Fifteen out of 20 producers reported that they and their families liked goat milk. It was believed that due to its low fat content, goat milk was more appropriate than cow's milk for children and the elderly because it did not cause allergic reactions. One producer reported that his 18 month old son had only been given goat milk since he was born because he was allergic to cow's milk; expressing a

point of view generally held in both municipios, he said that his son was "stronger than children fed with cow's milk." Most producers are interested in increasing goat milk production. Our data shows a number of constraints which must be removed before these producers can attempt to increase production.

Seventy-eight percent of the producers said they could not increase goat milk production. The main reasons given were lack of adequate pasture and rations, 52 percent; and quality of the local goats, 35 percent. At the same time, the following elements were considered by the producers as being necessary to increase goat milk production: increased ration and pasture, 35 percent; improved goats, 26 percent; and, ration/pasture and improved goats, 22 percent. (Table 20)

Sixty percent of the producers felt that they would not be able to purchase improved milking goats. Producers were evenly divided over whether it was possible to change management systems in order to increase milk production. Increasing goat milk production was not considered as requiring much additional labor time by 55 percent of the producers, although 60 percent of them said that they would have to make changes within their production units if they introduced improved dairy goats. These changes would involve, for instance, building facilities and cultivating pasture.

Sixty-seven percent of the producers thought that goat milk marketing would be difficult. Thirty-three percent said that milk could be sold either to neighbors or in the villages' grocery stores and markets. The latter, however, would be difficult due to transportation and storage problems, and to the lack of processing industries. Goat cheese,

Table 20

Potentials and Constraints to Increase Goat Milk Production

= 23 Potentials and Constraints	Soledade N = 14 Frequency	Percent	Sao Joao do Cariri N = 9 Frequency	Percent	Total N Frequency	Percent
Considered themselves:						
Able to increase goat milk production	4	29	-	-	4	17
Unable to increase goat milk production	9	64	9	100	18	78
Not applicable	1	7	-	-	1	4
Constraints:						
Lack of pasture and ration	8	57	4	44	12	52
Quality of native goats	4	29	4	44	8	35
Lack of credit	-	-	1	11	1	4
Others	2	14	-	-	2	9
Elements needed:						
Ration, pasture	4	29	4	44	8	35
Improved goats	4	29	2	22	6	26
Ration, pasture, improved goats	4	29	1	11	5	22
Credit	-	-	1	11	1	4
Not applicable	2	14	1	11	3	13
Ability to spend:						
More time, more money	9	64	2	22	11	48
More time	2	14	-	-	2	9
None of the above	3	21	6	66	9	39
Not applicable	-	-	1	11	1	4

however, was considered easily marketable by 98 percent of the producers. (Table 21) Traditional cheese making involves covering the cheese with salt so it can be conserved for a long period of time without refrigeration.

Table 21

Producers' Attitudes Towards the Commercialization of Goat Milk and Cheese

	Soledade		Sao Joao do Cariri		Total	
Attitudes	Frequency	Percent	Frequency	Percent	Frequency	Percent
Goat milk						
There is a possibility	10	40	4	22	14	33
There is no possibility	15	60	14	78	29	67
Total	25	100	18	100	43	100
Goat Cheese						
There is a possibility	25	100	17	94	42	98
There is no possibility	--	--	1	6	1	2
Total	25	100	18	100	43	100

Ninety-six percent of the producers said they would make goat cheese with sufficient milk. Milk could be used for cheese making once the kids' and the households' milk consumption needs were met, and the households' cheese consumption was provided. Fifty-nine percent of producers would make cheese for both home consumption and sale; 36 percent would make it for home consumption only and only 5 percent exclusively for sale. (Table 22)

Table 22

Household Units Willing to Make Goat Cheese

Attitudes	Soledade		Sao Joao do Cariri		Total	
	Frequency	Percent	Frequency	Percent	Frequency	Percent
Would not make cheese	-	-	1	11	1	4
Would make cheese	14	100	8	89	22	96
Home consumption	4	29	4	50	8	36
Sale	-	-	1	13	1	5
Home consumption, sale	10	71	3	36	13	59

Cheese would be sold at village grocery stores and markets and, to a lesser extent, to merchants and neighbors. Goat cheese was very popular both among the rural and the urban populations. Seventy percent of the people in the sample liked goat cheese. Observations made at both the local and regional markets confirmed the fact that goat cheese is practically unavailable, although demand is high.

The data in this section provides information on the general characteristics of peasant households, the role of livestock within the total production, the level of technology utilized in goat production, and the practices, potentials and constraints to increase dairy goat production. The following section consists of the overall conclusions of this research as well as it consists of some suggestions for research and policies concerning small farm production in the Northeast.

CONCLUSIONS AND SUGGESTIONS

The purpose of this study was to increase the understanding of peasant production systems in the semi-arid Northeast Brazil through the analysis of goat production. Goat production is the starting point for analysis of forms of production. This approach reveals the resources, technology and organization required for production at specific historical times (Saint, 1977:19).

As a result of the study, it is possible to identify the level of development of the productive forces within peasant units, particularly concerning goat production. We utilized these data, plus data about peasants' access to land, to water, to labor, and to capital in order to better understand local peasant strategies.

It is important to emphasize the dual purpose of this study. On the one hand, we sought to contribute to a better understanding of peasant production and, on the other, we sought to collect information which could be utilized by state research and extension institutions attempting to increase peasant goat production in the region.

Within this context, particular attention was given to milk production for two reasons. First, increasing peasant goat milk production was one of the objectives of a multidisciplinary, international small farm development program in the area (SR-CRSP). Second, due to the fact that dairy production depends on the livestock's genetic potential and on good nutrition, we were uncertain whether the peasantry could expand milk production. Therefore, this study was developed in order to assess whether they had the material means to expand milk production. The need for this study was justified by the fact that field observations, prior to the

collection of data, indicated that goat milk production was not part of the current production strategies of the small households.

The analysis of single products, produced within diversified peasant production systems, cannot be conducted unless those systems themselves are analyzed in their totality. Therefore, the nature of peasant production systems, their structure and dynamics, was considered prior to the analyses of goat/goat milk production, and of the potential impacts of technologies.

In discussing these issues it must be remembered that peasants are producers and consumers of commodities within a larger capitalist system. The peasantry is a crucial element for the development and functioning of the capitalist agricultural economy in peripheral societies. The peasant economy is a product of the dialectical process of capitalist development. This should be kept in mind throughout the following discussion in order to understand the relationship between peasant production and the capitalist economy, as well as to understand peasants' production strategies, and to assess the potential for the introduction of new technologies.

Although the peasant mode of production exists within a larger capitalist economy, it does not have the same structure, same dynamics, commoditization levels and forms as capitalist production. However, peasant economy is not a branch of production 'on and by itself'. We believe that in Northeast Brazil today, peasant and capitalist production cannot be placed at the extremes of a continuum, as diametrically opposed to each other. While peasant and capitalist producers may share some characteristics, they also present some important differences. For example, the local small farmers' main objective was to ensure

subsistence while the large producers' main objective was to produce for the market.

The local peasant production systems were characterized by low access to the means of production and to markets. These producers were primarily subsistence producers. Their subsistence strategies were the consequences of their low and highly variable levels of income and their high dependency on crop and livestock production for both subsistence and sale. Their levels of income determined both the levels of consumption and market interaction primarily through the sale of livestock, particularly small ruminants and other small animals such as swine.

We found that the peasant households were characterized by the predominance of economic calculations for simple reproduction, of unpaid family labor, and by the production of commodities with the ultimate goal of satisfying the households' immediate needs. These units also presented a partial integration to the market and, the household personal consumption levels were remarkably flexible.

The peasants studied were not able to change production strategies rapidly, since these strategies are the outcome of long-term adaptations to local ecological, socio-economic and political situations. The production strategies were more a response to environmental conditions and to household economic needs rather than a response to market changes. These, in fact, were the main barriers to increased productivity or to commodity specialization.

Because these peasants are incorporated into the market economy, changes in the latter unavoidably affect them. For example, they decrease consumption levels to a minimum and continue to sell their products at lower prices when prices fell. The reason was that these

peasants frequently required goods and services not produced at the household level.

Among the strategies for household survival, producers engage in factor substitution arrangements such as substituting land for labor, and to reduce risk through networks of horizontal and vertical socio-economic relationships. Examples of the latter are interpersonal loans and the common utilization of grazing lands by the herds of all sizes of farms.

We found that peasants very often engage in non-capitalist relations, so that they could survive within the capitalist economy. These relations show that the peasantry's position within the rural society and the nation is primarily determined by their socio-economic conditions. This, in turn, indicates the basis for social differentiation.

The social differentiation of rural populations deserves further consideration, since it is a continuous process of re-structuring society whereby people's role as producers and consumers may change significantly over time. In other words, it is a process leading either to the proletarianization or the capitalization of the rural population.

It seems that the Northeastern peasantry was in the process of proletarianization rather than capitalization. Even though this is not a simple issue, and would by itself be appropriate as a thesis problem, some of our findings support this argument. We found, for instance, that the access to land and water determined the form of integration into the market or capitalist economy. Peasants with access to both land and water were incorporating more commodity relations into their production systems than were others. In our sample, those producers were also in a better position to harvest good crops and to provide better pasture for their livestock.

Even though the primacy of land and water in determining the socio-economic differentiation within the rural population is an aspect of great importance, one should not limit analysis to it. We must remember that the peasantry is a part of rural society and of the nation, therefore occupies a specific position within it. Therefore, behind the obvious land and water issues, we suggest that there are a variety of other factors that influence peasant production. These are the peasantry's inability to overcome poverty and to increase agricultural productivity as a result of their economic, social and political position within society. The peasants were suppliers of cheap labor and foodstuffs to wealthier rural families and to the urban population.

The proletarianization of the peasantry might occur through means other than the producers' complete alienation from the means of production. Many peasant producers in the Northeast are, in fact, still landowners. However, they are also in the process of becoming proletarians as they increasingly need to work outside their farms in order to survive.

The role of merchants and/or bulkers in regions which are infrastructurally and economically underdeveloped, such as the interior of Northeast Brazil, also deserves special attention. Poor peasants in this region, who relied on bulkers and/or merchants for the transportation of commodities to and from village markets, necessarily developed dependency relationships. These relationships involved loans and lower prices for commodities in exchange for the assurance that the merchants and/or bulker would come back to the peasants' households the following week to gather the commodites for sale. Merchants often provided producers with the only income they had. Therefore, efforts to increase peasant production which are not simultaneously accompanied by

infrastructural improvements, such as those related to transportation and marketing channels, are likely to fail.

The peasants' inability to overcome their subsistence orientation was not due to their backwardness or unwillingness to improve production. Rather, it was mainly due to the various structural factors which limited their possibilities for increasing production, selling commodities, and accumulating capital. Therefore, the diffusion of new technology among these particular small farmers should be undertaken within a perspective that takes into account these producers' social relations of production. It should also emphasize the potential changes in these same relations once new technologies are introduced.

Throughout our discussion, the negative aspects of the introduction of new technologies have been emphasized. We believe that by adopting a critical perspective towards technology we can emphasize the need for thorough analyses of the populations concerned. Furthermore, this might prevent the repetition of past mistakes.

Even though many agricultural technologies are theoretically scale neutral, access to all of their elements may be differently accessible to different rural strata. The material conditions of peasant producers, rather than peasant traditionalism, are determining factors in the acceptance of innovations.

Technology alone will neither transform non-capitalist production into capitalist production nor will it stimulate change toward more egalitarian forms of production, circulation and consumption of goods and services. According to Stavenhagen (1979) social change will occur only when there are changes in national social and economic structures. Modernization might even lead to greater inequality and social control when it is manipulated by privileged rural strata (Fernandes, 1979:119).

We conclude that the large farmers do play a role in Northeast Brazil. They are very often people with power and prestige, who use these attributes as means to obtain information, credit and services from the government at the expense of the small farmers.

Field observation revealed that farm size does have some impact on the farmers' access to extension services and on their potential to adopt new technologies. Farmers with larger production units developed closer ties with extension agents, and as such they were given priority in receiving government incentives to improve farm infrastructure and production. Sixty-nine percent of the production units with less than 50ha and 75 percent of those with 51 to 100ha did not receive any kind of technical assistance, while only 33 percent of those farms with 101 to 150ha did not receive extension or research help.

It should be clear that we are not arguing that technology itself, nor the changes it brings about are necessarily detrimental to all sectors of the rural population. Instead, we are arguing that technology might result in radical and even irreversible changes in the way labor, land, capital and other resources are allocated. This which might in turn destroy some sectors of the rural population. It might involve the appropriation of benefits by some farmers at the expense of the others.

Since we accept the fact that the introduction of new technologies by peasants and the development of productive forces are dependent on the availability of capital, we must conclude that the local peasantry cannot be expected to improve their crops' productivity under present conditions. Our conclusions support George's (in Szmrecsanyi and Queda, 1979:23), i.e., that small farmers can only count on small amounts of turn-over capital by the time the agricultural season ends, so they

"...can hardly modify, even on a limited form, the technical aspects of their farms."

A few ideas about the impact of technologies utilized to increase livestock productivity will now be presented. Two aspects concerning the introduction of new technology must be recalled here. First, given the nature of peasant production in the Northeast, it is clear that peasants, in order to increase goat meat and/or goat milk productivity, will have to introduce changes in both the allocation of scarce resources (land, water, labor and capital) and in the ways they have traditionally dealt with risk and uncertainty. Second, the nature of the local peasant production systems confirm our assumption that it is not enough to understand the production, circulation and consumption of single products within diversified production systems. Instead, the role and production strategies of single products must be analyzed within the total production system. We found, for example, that those integrative relationships identified by Vincze (1979:387-400) were also true in our research area.

Vincze also argued that the introduction of more productive technologies involves conflicts in the allocation of land, labor and capital. Here land and labor are key land and capital as non-integrative factors, since labor needed for livestock production did not seem to be a big problem. Labor, however, was identified as a scarce factor of production in peak agricultural seasons. Because the traditional livestock management system in peak agricultural seasons was characterized by the freeing of the animals (particularly goats) in the caatinga, goat production does not strain household labor allocation. This may change when intensive livestock production is undertaken, even with goats.

Vincze argued that in areas of short supply of land, intensified animal production ultimately implies a conflict between human and animal needs. Such a conflict might occur in several ways, such as over the allocation of land for livestock production, which was previously used to grow foodcrops. The urban population, therefore, could face a shortage in the supply of staples, which we doubt would be replaced by a significant increase in the supply of animal products. The ideal solution to this problem would be to find ways to increase animal production without jeopardizing staple production.

Other things however, may also jeopardize the conditions of peasant production. We found that the fencing of farms by medium and large proprietors in order to intensify livestock production, created a series of socio-economic problems for small producers. Some of these problems were the reduction in the amount of land available both for common grazing and for renting by small farmers, and the decrease in the demand for temporary wage labor upon which small farmers often relied for additional incomes. An excellent description of this phenomenon is found in Goodman and Redclift's (1982:161-2) analysis of state livestock development projects in Brazil.

Intensified livestock production, as Vincze points out, involves the construction of shelters and fences, and the maintenance of high yielding pastures. The costs involved in these changes, are usually beyond the economic possibilities of peasant households. Although we did not conduct an economic analysis of households, their limited income, their rustic animal shelters and the poor quality of their animals and soils that they exploit make us believe that these peasants will rarely be able to incur the costs required to increase goat production. De Walt (in Barlett, 1980:555-6) found that the introduction of a new fodder crop by

Mexican ejido farmers was unevenly accepted by community members. He found, as we did, that capital was linked to access to land and that access to both of these factors were major determinants of the adoption of new technology.

Assessing the potential of increasing dairy goat production or of introducing it as a new activity was one of the objectives of this study. Therefore, we thought that Galina and Juarez's findings (1982:331-3) should be considered in this section. They reported that the Mexican government's effort to develop dairy goat production among ejido farmers failed for three reasons. First, because the technological model of dependency required the introduction of an exotic crop (alfalfa), whose water requirements were not met due to local environmental and infrastructural constraints. Second, the goats themselves were not genetically appropriate for dairy production. And third, even though some increases in goat milk production were obtained, this did not lead to increases in producer profits. Since no marketing studies were undertaken prior to the project, the local community could not to consume the milk produced, and its price fell. All of these reasons, we believe, are relevant to the case of goat milk production in Northeast Brazil.

In the municipios studied, goat meat production was an important part of the total peasant production strategy for household survival as a cash product which subsidized other farm activities. In Paraiba, therefore, goats were <u>not</u> produced primarily for household consumption. Instead, the incomes obtained through the sale of goats were utilized to ensure the households' production and reproduction. On the other hand, goats' survivability freed family members' labor and capital for utilization in other farm activities. These were, in fact, the main reasons goats were raised.

The peasants' infrequent interaction with the market depended on their household subsistence needs. In the case of goats, the sale of animals occurred only when there was an immediate need for cash, to satisfy some household need (health, education, feeding of more valuable animals, etc.). The implications of this strategy for applied research and diffusion of innovation were that chances for regular market production of goats and of their byproducts are doubtful. Most producers probably will not sell any more goats than those needed to provide the cash necessary for household needs.

Because of the producers' lack of regular income and because goats were highly adapted to the local environment, most producers believed that it would be wise to increase goat production instead of that of other livestock. However, they will not specialize in goat production. The aversion to specialization on one line of production was due to several reasons. First, diversification of production allowed peasants to supply their households with a variety of foodstuffs such as corn, beans, vegetables, etc. Second, these foodstuffs could be sold in different months of the year, whenever production outcomes were in excess of households' consumption needs. Most of what was produced, therefore, acquired either a subsistence or a commercial characteristic depending on the level of production attained and/or household needs.

The fact that most producers were willing to increase goat production and that producers believed that there was demand for goat meat, hides and cheese, should not be taken as the only factors determining the potential for increasing production and commoditization. One aspect of the local peasant production strategy was that cash products, such as goats, involved a strategy of minimizing risk and uncertainty as well as the costs of inputs, through an efficient use of

locally available resources. We suspect that once goat production becomes more expensive and risk and uncertainty are not decreased, peasants might go back to the traditional management systems.

Even though goats were important sources of household income, the introduction of new technologies will not necessarily improve the peasants' standard of living. Although there is a potential for increasing goat production, this might negatively affect the magnitude of the incomes generated by means of the increased costs of production. In order to increase goat productivity, particularly milk, the producers will necessarily have to purchase improved animals, feed, and facilities, for instance. These costs, however, tend to increase at a faster rate than the prices paid for goats and their byproducts at the market.

An observation of the local market prices showed that the price of grains and cottonseed meal, for example, increased at a faster rate than the price of goat meat and milk. Even though the prices should be adjusted for the high inflation rate in Brazil, and long-term studies should be undertaken in order to assess the seasonality of price fluctuation, the illustrations below show the relative higher increases of prices of some commodities over others.

For example, in October 1982, one 68kg corn sack was sold for CR$ 1,500-2,000 as compared to CR$ 2,000-3,000 four months later, an increase of up to 43 percent. Goat meat, however, increased from CR$ 450 to only CR$ 500/kg in the same period of time, only an 11 percent increase, while goat hides decreased from CR$ 500-600 to CR$ 350. These market fluctuations are important elements to be considered by state efforts to increase market supply so that producers can be sure both of their input costs and of their potential profit. To the extent that the meat and milk prices keep up with the price of grains and other feeds, then

producers will not incur deficits in their goat operations. Then, the possibilities of such efforts to become failures such as in Galina and Juarez's (1982) study will be diminished.

The increasing costs of production may decrease the returns to labor within small production units, a process called "simple reproduction squeeze" by Bernstein. As Bernstein points out (1979:436), the prices of commodities are determined by the "average socially necessary labor time required for production", which in turn is determined by the conditions of production in branches with the highest productivity of labor.

This issue becomes particularly relevant when we consider the fact that peasants will not be able to intensify production significantly in the near future. The main reasons are that SRD goats have a very low productivity, and that increasing production involves improvements in nutrition, particularly in the case of goat milk production. Although part of the nutritional requirements might be provided by the development of technologies to make a better use of the caatinga, much supplemental feeding would still be required. Part of this feed will have to be purchased.

These factors, plus the fact peasants compete both among themselves and with market-oriented producers, might ultimately contribute to the deterioration of exchange relations of peasant producers. The potential for the introduction of new technologies to increase productivity, therefore, depends not only on the peasants' access to the means of production and on the nature of the commodity, but also on the level of development of the municipios' infrastructure, particularly their marketing systems. Ecological conditions, such as rainfall and topography are also important.

Considering the above issues, it appears peasants will rarely have the capital needed to increase goat milk production. Dairy goats require good nutrition which, given the local environmental conditions, would have to be supplied by the purchase of grains and other nutrients.

One factor, however, does constitute a potential for increasing goat milk production in the region. This factor was that increasing goat milk production would not overtax the households' labor supply. Another favorable condition for increasing goat milk production was that the producers themselves would like to increase production of both milk and cheese, and there seemed to be a good market demand for the cheese.

The local producers' subsistence orientation, and the fact that goats were primarily a cash product for subsidizing household production and reproduction, might be positive factors in leading them to increase production once the constraints discussed above are resolved. Increases in goat milk production, however, are more likely a consequence of improvements of the herd conditions and of increasing goat meat commoditization, rather than as a starting point for increasing goat production and commoditization, and for improving the peasants' quality of life. Furthermore, for goat cheese to become a source of income for the local producers, goat milk production must increase significantly. This is because cheese will only be sold after the following household needs are satisfied: 1) milk for the goat kids; 2) milk for home consumption; 3) cheese for home consumption.

Given peasants' situation, a few remarks will be made so that efforts to increase goat and goat milk production might have a greater chance of success. We understand that more studies of a socio-economic nature should be undertaken in the various states and microregions of the Northeast and, to the extent that it is feasible, also in the various

municipios. The data that should be collected in these studies would serve the double purpose of identifying both the generalities among the different study sites and their specificities.

We have found that the following issues deserve particular attention. First, it is necessary to understand the nature and the role of goats and their byproducts in relation to other farm activities within the peasants' production systems, both as subsistence and/or cash crops. This would allow for the determination of a number of constraints faced by peasants as they engage in production, distribution and consumption activities. It would also allow for the determination of the possible outcome of state development programs, such as the potential diversion of financial and structural services to crops other than those originally planned.

Second, it is necessary to identify this particular commodity's state of development of the productive forces at the peasant unit level, to identify its relationship to the level of development of the municipios', microregions' or states' infrastructure, and to establish the primacy of one over the other.

Third, it is necessary to analyze how land and water access relate to capital availability and to the stage of development of the productive forces as related to goat production and to the peasants' position in the larger society. Furthermore, in this respect an assessment of the proletarianization or capitalization process would be necessary.

In this research the local peasants were very poor, had low access to the means of production, and relied on low and irregular incomes. They also avoided risk as related to changes in their traditional production systems not because they culturally resisted change or because

they were ignorant. Rather, taking risks could mean jeopardizing their own subsistence.

Therefore, we must consider the fact that we are dealing with a very fragile production system which will be modified through the intensification or introduction of crops. In order for these changes to be accepted and beneficial for the producers, we suggest the following: 1) that research efforts be oriented towards the development of low-capital technologies and to the maximum utilization of the locally available resources; 2) that particular emphasis be placed, by research and extension agencies, on basic prophylatic measures which would show producers that their herds may significantly improve during a short period of time; 3) that the state takes on the responsibility of providing the small producers with enough land and water so that they can improve production and their quality of life; and, 4) that the state takes on the responsibility for improving the municipios' infrastructure, particularly in relation to the means of transportation and commercialization of the products, in addition to the provision of incentives (both financial and technological) specifically for the small producers.

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