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Determinant factors of dairy production in the productive agglomerate of Alto Paraguay[1]

The milk production in Mato Grosso State (Brazil) presents growth in most regions, and the Productive Agglomerate of the Alto Paraguay is the only space that obtained differentiated institutional support during the last decade, becoming a source for reflection on the current socio-economic condition of the milk producers. With an on-site research base and Multivariate Analysis basements, this study aims to define an underlying framework of the determinant factors for the activity's development in the region. Results show a family activity in the limited stage, mostly in view of managerial problems. The productivity is low because the operational factors and the prices charged do not allow suitable investments to overcome these limitations.

1. Introduction

The dairy production in Mato Grosso has become a very important activity among small farms, many times representing the main source of family's income. However, the volume produced does not present a significant and constant annual growth in all regions, but on the contrary, swinging periods (seasonality). Other factors that cause income variability are the profitability of other parallel activities, or the inability to adapt to the scale and technical exigencies imposed by the industry, as well as by the lower prices paid for milk in the farm. Moreover, the producers intend to adapt the handling to the particularities of properties, many times presenting a trade-off unfavourable to other activities. Many aspects such as the size of the area, labour and available technologies, as well as the price imposed and the insufficient animal genetics, limit many times the dairy livestock growth in the State.

Historically the Mato Grosso dairy activity presents a significantly adverse price condition: very high in retail and low when paid to producers; a factor

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that demands some compensation, by means of a productivity increase or production costs decrease. According to the data released by the Brazilian Institute of Geography and Statistics, the relative numbers of the milk productivity in Mato Grosso reveal a worrisome scenario: since 2000, the average of only 1,075 annual litres, represents less than four litres/day for milked animal. In this same period, the annual average growth of the productivity was only of 0.9%, reflecting the incapacity to incorporate the newly available technologies.

Besides the productivity matter, another aggravating issue is the average growth of 4% in the milked animals in Mato Grosso since 2000. The incapacity of the local dairy livestock in providing the supply is the main bottleneck related to the current market condition. The need to increase the milk production is urgent; nevertheless, the chain restructuring is fundamental, otherwise, the gap between the retail price and the farm price will not decrease. Without generating the adequate production scale, the productive dairy sector will remain inexpressive, appearing as a complementary activity and the market will continue to be held hostage of exogenous products.

Access to sufficient alimentation, safe and nutritious are important factors for food security considering the main basements of the Food and Agriculture Organization of the United Nations (FAO). A probable inability of the local dairy livestock in providing supply also tends to hamper the restructuring of the local supply chain and decrease the gap between the retail price in detriment of what paid in the farm. Another issue is related to the fact that most brands do not act in the productive sector in Mato Grosso, keeping their expressive operations only in retail, with milk produced in other regions of the country.

The incentive policy for restructuring the milk productive chain in the State needs to consider the readjustment of the properties, the technology incorporation and genetic improvement to the productive process to generate the adequate production scale, with quality milk, in order to prevent the dairy productive sector from turning into a secondary activity. The definition or the selection of technologies and strategies are not often a simple task that can be just defined by the producer's experience in the activity. In this context, it is necessary to rethink the management and the organisational structure, adopting technologies and systemic strategies that answer to the challenges. Otherwise, the main industries of the branch will continue outside the process and the minimum alimentary bases supported by FAO will not be attended at the local level.

One of the main initiatives of Mato Grosso Government in 2003 was the adhesion to the work group of the Development, Industry and Trade Department, which aims at stimulating the consolidation of productive agglomerates at national level. Since then, all the activities with such characteristics proceeded to have priorities, with mechanisms of particular incentive and an

official management institution. Among all the State regions, one requires special attention: that of the milk Productive Agglomerate of the Alto Paraguay, whose territorial base encircles the municipal districts of Alto Paraguay, Arenápolis, Denise, Nova Olímpia, Tangará da Serra and Santo Afonso, with management of old Regional Development Programme (MT REGIONAL) since 2007. The data provided by the referred program point a public target of about 650 milk producers supported by the initiative.

By means of the Agreement 025/2008, between Industry and Trade Secretary (SICME) and the Association of Small Midwest Dairy Farmers (APPLCO), the Industrial Development and Trade of Mato Grosso Fund (FUNDEIC) contributed with 69 thousand dollars in the construction of a minimum sized plant and in the acquisition of industrial equipment for milk processing. In complement, the old State Rural Development Secretary (SEDER) distributed 40 thousand semen doses of Dutch, Girolando and Gir cattle to the local producers; for the genetic improvement and productivity increase. The goal of the set of actions is to triple the milk production in the agglomerate region in the next five years. Furthermore, promoting the production intensification would led to an increase of milk and of the by-products consumption index, processed by local companies.

The fact is that historically there has always been a considerable distance between the abstract plan and the materialisation of the support instruments, a common characteristic of all Brazil's regions. Moreover, it crystallised a local conduct, typical of the State, thus creating the operating conditions of the productive agglomerates, starting from FUNDEIC's public funds; this arrests therefore the development of synergic forces, concatenated to the political decisions. The access capacity for public funds becomes essential to the agglomerates' survival; a critical solution since it represents a dependence from an external agent.

Nevertheless, the milk producers referenced in this study had a technical and financial support over the past decade, thus turning them representative for the sector in question. Therefore, they have better conditions to develop the competencies to internalise the challenges and the ability to absorb the negative trends faced by the sector in Mato Grosso. It is precisely the principle of the reflection proposed in this study, focused to determine what is the current socio-economic condition of the milk producers of the Productive Agglomerate of Alto Paraguay. It is also questioned if the economic policies were able to improve the productive efficiency and consequently the dairy activity indicators.

In general lines, the objective is to accomplish a delimitation and evaluation of the main factors responsible for the dairy livestock development in the municipalities that compose the productive agglomerate, considering the im-

portant aspects of the farm. Specifically, the main objectives for the definition of these factors, in the first moment, pass by the production evaluation, mainly considering the average milk productivity of farms. In the second moment, are evaluated the related aspects with the infrastructure, technologies incorporation and animal genetics improvement. Then, the study will be focused on the market aspects and the price composition that influence the milk production and the social conditions of the milk producers.

The empirical strategy considers an on-site research at dairy properties, with primary data using a questionnaire properly elaborated to compose a robust base, considering socio-economic aspects, as well as those related the managerial capacity, infrastructure, market and innovations of any nature. Moreover, the descriptive-quantitative analysis destined to contextualise the activity uses the set of data obtained, the Multivariate Analysis basements, utilising the Factorial Analysis, with the purpose to define an underlying framework of the data matrix, to analyse the interrelations structure of the expressive number of compiled variables. It is the establishment of the determinant factors, which delimits the productive and managerial capacity of the agglomerate.

The research accomplishment is justified by the fact that milk is considered one of the main nutrient associated with the food security, besides its nutritional aspects and supranational productive chain. Worthy of note is the socio-economic activity, generating income and giving better condition, so that many families keep satisfactory levels of consumption. Understanding how it is possible to turn the dairy livestock more efficient is a fundamental key for the improvement in life quality of this producers' group, main agents of this process, as well as decrease the productive deficit in the regional market.

Considering the importance of the dairy activity in Mato Grosso and Brazil, a study of the National Bank of Economic and Social Development (BNDES) has included the region in a group of national priorities, classifying the dairy livestock as potential income generator for the local families. They were analysed questions related to the managerial capacity, production and elaboration of a marketing plan for the dairy sector in Mato Grosso. Since the support of the Mato Grosso government in 2003, six years have passed, and the first evaluations of the study revealed that most proposed actions and innovations were not promoted in an efficient form.

It is important to register that there are no other studies, with the minimum scientific rigidity, in Mato Grosso about the proposed theme, a fact that complicates a better contextualization of the activity, but which nevertheless, assures the importance of the promoted results. However, it is necessary a previous theoretical-methodological discussion, addressing the main elements that compose the selected empirical strategy. The substantial number of primary information provides a context with some consistency degree, but needs

the analytical contribution, based on Multivariate Analysis to assure the robustness of indicators. The sampling requisites are contemplated, the analytic structuring and the results also are discussed before the final considerations.

2. Theoretical and methodological approach

The empirical matrix considers the strategic information obtained on site and the milk producers, listed in the defined space for the Productive Agglomerate of the Alto Paraguay. The collection instrument consisted in a structured questionnaire, with defined fields, in a sense to capture specificities and, at the same time, broader aspects linked to the properties. Firstly, it seeks to define the socio-economic conditions of the agglomerate producers and the relation with the activity, causes and consequences. Another field aims at collecting information that demonstrate the productive process in the properties and the use of resources, considering the management levels and available technologies. Other questions try to explain the producer's relation with the market, the prices composition and the financial perspective for the activity. Finally, the questions seek to understand the learning dimension and the dairy livestock tendencies in the agglomerate.

The characterization of the local activity takes into account the structural information to reveal the socio-economic conditions of the milk producers, their relations with the market and the managerial capacity of the farms. About the economic matters, it prioritised the registration of data related to the quantitative involved in the productive process, starting from the supply of inputs, the average structure of costs, up to the final value of production.

The data that condition the producer's life quality was considered primordial for the evaluation of the social status imposed by the activity in the agglomerate. Among the considered factors, it is important to register the basic aspects related to education, health and basic sanitation; however, the deepening degree also reveals the level of fatigue caused by the activity. Nevertheless, these are the technological aspects, which reflect the training degree of properties and the impact of this about the necessary work for the processes management inside the farm, once the industry selects elements of this nature to assure the scale and the minimum quality for if to structure in the space.

Works accomplished in Minas Gerais, main milk producer State in Brazil, reveal important particularities about the dairy activity, that can serve as a base for this study. Conclusions about the profitability of 159 farms in the Triângulo Mineiro and Alto Paranaíba regions reveal that the positive profit happens in properties with a higher number of cows in lactation, lower labour costs and higher investment in the ration. The analysis of the main compo-

nents has also revealed that 25% of the properties keep negative profitability because they do not observe these aspects (Resende *et al.,* 2016).

Based on productive quantitative factors, associated with the size of the areas, Stock *et al.* (2008) concluded that the best strategy for economic efficiency is the productivity increase. However, a study in national level accomplished by Pastrana *et al.* (2016), considering the same criterion, sought to determine key-parameters associated to the milk production in Brazilian municipalities. The results point contradictions because it was also identified that many of these locals lead the milk production even with low productivity, given the high number of cows. The study generated better characterization and considered that the quantitative efficiency could also be used as an adequate indicator in the evaluation and the comparison of productive variables.

At the international level, an ample study accomplished with 22 European countries, between 2004 and 2012, introduced farms data with the purpose to estimate the productive efficiency. The results indicated that the properties are expressively efficient, because of this they would get to increase the production using only their available resources in a more effective form. It is a stability condition that allows to confront adversities, such as the productivity reduction. In this sense, policies for promoting the productive efficiency are adequate to face market shocks, prices volatility and to keep the producer's income level (Furesi, *et al.* 2016).

Considering that the proposed goal passes by the development evaluation of the Alto Paraguay dairy livestock the variable selection also tried to respect the most expressive aspects of composition of the necessary factors to understand the evolutionary process of the agglomerate. It sought to delimit the activity capacity to absorb new inputs and potentiate the endogenous development, considering the denominated agglomeration economies that are, in the factors that the activity presents, with the capacity of interfering in its structure.

This descriptive diagnosis is nevertheless important, its validity is intensified by the inclusion of the underlying indicators of the Factorial Analysis. The grouping of this characteristic in factors properly ranked reveal the activity's structuring degree, whose elements are in satisfactory conditions or not. This becomes possible because the methodology can be used to group variable and to delineate variation standards in the characteristics, using distinct factors, which can also be interpreted as activity potentialities. When calculated, they are able to represent complex phenomena, to the point of explaining the activity's development process in the municipalities that compose the agglomerate region.

Still, the use of Factorial Analysis in this research is necessary because of its capacity to establish reliable indicators, compiling mathematical abilities,

verbal, logical reasoning, among others, that could be explained by a common factor of intelligence, a Charles Spearman and Karl Pearson contribution, responsible of the first trials about the referred technique. In 1935, Thurstone developed the idea of multiple factor analysis, and then Hotelling proposed the principal components method that allows the calculation of an only matrix of orthogonal factors. This accumulation of different trials and the application of different techniques explain the development of the Factorial Analysis and their use in studies in the last decades (Zeller and Carmines, 1980).

Among the most recent contributions, it should be noted that the Factorial Analysis describes the variability of a random vector X, using a reduced number of random variables, denominated common factors. This model explains, from the selected factors, the variability of X, in which the rest not included is part of the random error (Mingoti, 2005). According to Santana (2005), the technical study tries to condense information, in a kind of summary, that owns capacity of explaining a structure as a whole. The factors can explain isolated dimensions of a determined data structure or a dimension of the whole.

The basic model of factors is usually expressed in the matrix form, in which:

$$X = \begin{bmatrix} X_1 \\ X_2 \\ \vdots \\ X_p \end{bmatrix}; \Lambda = \begin{bmatrix} \lambda_{11} & \lambda_{12} & \cdots & \lambda_{1q} \\ \lambda_{21} & \lambda_{22} & \cdots & \lambda_{2q} \\ \vdots & \vdots & \vdots & \vdots \\ \lambda_{p1} & \lambda_{p2} & \cdots & \lambda_{pq} \end{bmatrix}; F = \begin{bmatrix} f_1 \\ f_2 \\ \vdots \\ f_q \end{bmatrix}; E = \begin{bmatrix} e_1 \\ e_2 \\ \vdots \\ e_p \end{bmatrix}$$

X = is the p-dimensional vector of original variables, $X' = (x_1, x_2, ..., x_p)$;
F = is the q-dimensional of common factors, $F' = (f_1, f_2, ..., f_q)$;
E = is the p-dimensional of unique factors, $E' = (e_1, e_2, ...e_p)$;
Λ = is the matrix (p, q) of unknown constants.

Concerning the parameters for the model, it is necessary the use of methods and tests to validate and turn the result most consistent. About the rotation, the Varimax mode is more appropriated to this kind of analysis, because it has factors with significant variability in loadings. It is a compilation of a group of variable highly correlated with the factor and, from another group, with negligible correlation to the same factor. Concerning the number of factors, the model determined them freely so that the same were able to explain, in a complete form, the collected data (Mingoti, 2005).

The significance was also checked by Bartlett's Test and Kaiser Meyer Oklin (KMO). In the first case, how nearest of zero is the result of the test, the

null hypothesis will be rejected, and the analysis can be accomplished (Hair *et al.,* 2005 and Mingoti, 2005). According to Mingoti (2005), so that the results be considered valid, it is necessary that all communalities are superior to 0.5. Also KMO searches to determine if these variable are correlated to each other and the desirable indicator must be next than one, however, superior to 0.5.

Besides, it can be used the criterion of the accumulated variance as basements to determine the quantity factors that should be extracted. Hair *et al.* (2006) suggest as acceptable an explanation of at least 60% of the variables universe. In the case of the confirmatory Factorial Analysis, also the statistical criterion can present theoretical argumentations to justify the factors extraction, considering conceptual terms or standards of possible relation among the variables and the factors.

With the number of information, it is hoped the biggest possible; it is recommended a minimum sample of 50 observations. Nevertheless, it defines as advisable, at least 100 cases to assure robust results and the reason between the number of cases and the quantities of variables should not be lower than a relation of five to one (Hair *et al.* 2006). In this case, it used the sampling technique described by Andrade (1985), to estimate a wished number of milk producers able to represent the approximate universe of 650 listed for the six municipalities that compose the agglomerate, considering a sampling error up to 10% and a confidence level of 95%. The referred technique is determined by the mathematical expression:

$$n = \frac{z^2 \cdot p \cdot q \cdot N}{e^2(N-1) + z^2 \cdot p \cdot q}$$

on what:
N = population size;
p = percentage with which the phenomenon verifies;
q = complement of p;
z = chosen confidence level (95% = 1,96);
e = sampling error allowed (e <= 10%);
n = sample size.

The suggested sample was made up of 87 elements. In order to attend the desirable relation between the number of cases and the variables, they have collected 120 information, respecting the minimum number of 20 valid observations for each one of the municipalities that comprise the agglomerate. The questionnaires were applied directly to the milk producers, during visits accomplished in the properties, with posterior compilation in an only spreadsheet to compose the research database. The factors and the other tests and

indicators were estimated with SPSS software and arranged in the subsequent results section. The presentation of the primary data, as well as the analytic model, are arranged in tables and graph, of intercalated form, for better results complementarity.

3. Determinant factors of dairy livestock

In the first moment, the evaluation of the test results and the necessary parameters confirm the significance of the results indicated by the model. The Bartlett's Sphericity Test presents significance level next to zero, reason for which the null hypothesis is rejected. In complement, the Kaiser-Meyer-Oklin superior to 0.5 indicates that the variables are correlated to each other (Tab. 1), and the results can be analysed.

Tab. 1. Bartlett's Test of Sphericity and Kaiser Meyer Oklin, 2016

Kaiser-Meyer-Oklin: Measure of Sampling Adequacy	0,774
Bartlett's Test of Sphericity: Approx. Chi-Square	1837,709
D.f.	276
Significance	0,0000

Origin: SPSS 20. Extraction Method: Principal Component Analysis (Varimax).

In complementarity, all communalities are superior to 0.5 (Tab. 2). The total number of incorporated variable by the model was the maximum desirable (24), in attention to the recommendation that the quantity of variable should respect the relation of five to one, considering the number of observations.

The variation explained by the rotated factorial loads corresponds to 73.5% from the total of the employed variables (24), divided into seven factors. The parameter of 60% is contemplated by the five first factors; nevertheless, the first and the second are the most expressive and explain together 38% of the database (Tab. 3).

Once contemplated all the model parameters, the main grouping composes the denominated Production Factor, responsible for the explanation of 21.9% for the productive structure, considering the variables that compose it in each property. It reveals that the milk production is stable, with properly adjusted expenses to the number of animals, besides the energy and medications expense, the milk production together with the reproducers' availability present the minor factorial loads (Tab. 4).

Tab. 2. Communalities Presented by the Variables, 2016

Variable	Value	Variable	Value
Milk Production	0,787	Financial Control	0,599
Total Cows	0,857	Activity Time	0,520
Lactation Cows	0,833	Employees	0,649
Expense Ration and Silage	0,838	Annual Vacation	0,624
Expense Medications	0,724	Covered Shed	0,899
Expense Energy	0,630	Covered Milking	0,906
Expense Combustible	0,595	Sells to Dairy Industry	0,858
Expense Total Average	0,733	Payment on day	0,878
Reproducers	0,663	Water in Property	0,838
Number of Milking a Day	0,767	Alimentation Pasture	0,569
Mechanical Milker	0,746	Corral with Division	0,750
Cooling Tank	0,708	Alimentation Silage	0,689

Origin: SPSS 20. Extraction Method: Principal Component Analysis (Varimax).

Tab. 3. Total Variance Explained, 2016

Comp.	Initial Eigenvalues			Extraction Sums of Squared Loadings			Rotation Sums of Squared Loadings		
	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %	Total	% of Variance	Cumulative %
1	8,176	*34,066*	*34,066*	8,176	*34,066*	*34,066*	5,271	*21,961*	*21,961*
2	1,977	*8,239*	*42,305*	1,977	*8,239*	*42,305*	3,858	*16,077*	*38,038*
3	1,935	*8,064*	*50,369*	1,935	*8,064*	*50,369*	2,284	*9,515*	*47,554*
4	1,788	*7,452*	*57,820*	1,788	*7,452*	*57,820*	1,836	*7,650*	*55,204*
5	1,472	*6,135*	*63,955*	1,472	*6,135*	*63,955*	1,804	*7,517*	*62,720*
6	1,162	*4,842*	*68,797*	1,162	*4,842*	*68,797*	1,311	*5,461*	*68,181*
7	1,148	*4,783*	*73,579*	1,148	*4,783*	*73,579*	1,296	*5,398*	*73,579*

Origin: SPSS 20. Extraction Method: Principal Component Analysis (Varimax).

The fact of the lower factorial loads can be explained by some facts registered by the research in the farms. For example, the reproducers' availability requires attention, once only 16% of the properties use the insemination tech-

Tab. 4. Matrix of Rotated Components, 2016

Variables	Factor 1	Factor 2	Factor 3	Factor 4	Factor 5	Factor 6	Factor 7
Milk Production	,696	,486	,048	,087	-,136	,198	,008
Total Cows	,768	,328	,211	,155	-,061	,278	-,097
Lactation Cows	,847	,245	,124	,071	-,018	,018	,186
Expense Ration and Silage	,854	,185	,093	-,056	,056	-,084	,229
Expense Medications	,676	,177	,229	-,104	,157	-,180	-,339
Expense Energy	,483	,123	,312	-,010	-,235	,279	-,388
Expense Combustible	,758	,021	-,035	-,034	-,041	-,026	,127
Expense Total Average	,779	,304	,100	-,061	-,074	,085	,089
Reproducers	,543	,119	,285	,200	,154	,350	-,294
Number of Milking a Day	,324	,684	,091	-,077	-,358	-,079	,211
Mechanical Milker	,324	,706	,354	-,094	-,070	,044	,048
Cooling Tank	,245	,712	,355	,033	-,022	,059	-,102
Financial Control	,259	,612	,149	-,004	,293	-,213	-,067
Activity Time	,171	,573	,134	,044	,216	-,030	,308
Employees	,325	,651	-,066	,108	,047	,318	,021
Annual Vacation	,001	,730	,056	-,009	-,227	,121	-,146
Covered Shed	,127	,207	,904	,077	,028	,113	,064
Covered Milking	,172	,229	,906	-,027	,046	-,007	,020
Sells to Dairy Industry	-,011	,002	-,032	,915	,098	-,078	-,065
Payment on Day	,026	,009	,074	,923	-,103	,012	,095
Water in Property	-,109	-,169	-,026	,060	,885	-,062	,075
Alimentation Pasture	,032	,057	,070	-,058	,727	,168	-,002
Corral with Division	,050	,070	,076	-,091	,108	,839	,113
Alimentation Silage	,228	,045	,089	,023	,036	,128	,780

Origin: SPSS 20. Extraction Method: Principal Component Analysis (Varimax).

nique and because of this, need to keep the presence of the bulls among the animals. Other associated element witnesses respect to the average number of lactation cows: only 38% of the total number of animals in each farm; further facts indicate an inefficient management of the reproductive system or that the farms do not work only with dairy cattle. They are elements that contribute for an average of only 8.3 litres of milk per cow per day in the agglomerate, a very low reference when contrasted with the current technology of milk

production (Tab. 5). Furthermore, considering the contributions of Resende *et al.* (2016) regarding the lactation, these properties are not efficient and, more worrisome, can present negative profitability.

Also associated with the Production Factor, the other expenses for combustible, ration, silage and average total present some significant factorial loads, what indicates the adequacy of the productive structure. The exposed percentages in Table 6 are related to the average income for farm, originated by the dairy activity in the agglomerate (U$ 2,100 approximate) and the only case that is not suitable is that of combustible expense (40%). It presents elevated values and indicates that the dairy livestock is not the only productive activity in the agglomerate farms.

Tab. 5. Productive Averages of the Agglomerate for Farm, 2016

Category	Average value	Category	Average value
Milk Production US$	2.100	Lactation Cows	25
Total Cows	66	Average/Cow/Day	8,3

Origin: Data of the Research, 2016.

Tab. 6. Representation in the Milk Income of the Main Farms Expenses, 2016

Expenses	Average US$	%
Expense with Ration	441,00	*21%*
Expense with Medications	63,00	*3%*
Expense with Energy	105,00	*5%*
Expense with Salt	147,00	*7%*
Expense with Combustible	840,00	*40%*

Origin: Data of the Research, 2016.

The second grouping includes variables, whose characteristics allow to denominate Management and Innovation Factor, with positive factorial loads, however nearer to the recommended minimum (0.5) than to the wished unitary indicator. The research data indicate the average time of experience in the activity equal to 14.7 years, however what most worries is the number of milkings per day: in average, just 1.35 for farm. It is a factor of the direct impact on the milk average productivity, considering that the frequency in the increase

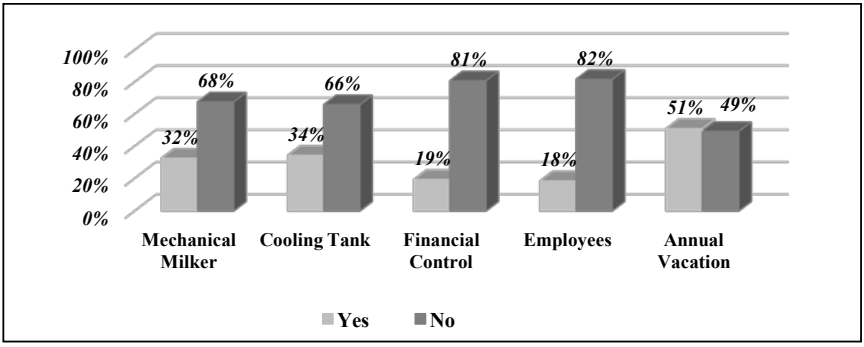
of the daily number of milkings can generate increments in the milk production up to 40% when accomplished a second milking and up to 25% when implemented the third milking. In this case, the agglomerate municipalities hardly will appear among the major milk producers in the future, because do not attend any of the determined parameters set by Stock *et al.* (2008) and Pastrana *et al.* (2016).

Still related to management, it is natural that the factorial loads are not next to the ideal because only 19% of the farms adopt some financial control and 18% have the structure to keep at least one employee. The best indicator of this factor registers that 51% of the properties can plan, at least, one vacation period every year (Fig. 1).

Regarding the two variables linked to the farms technification, the indicators are best; however, the farm's condition is still below the wished. The factorial loads are among the best for the factor, nevertheless, still below the desirable. Such evidence is justified by the simple fact that only the third part of farms owns mechanical milker and milk cooling tank (Fig. 1). This factor implies directly in the properties efficiency because the production could be increased only by using the available resources with more efficacy. Considering the contributions of Furesi, *et al.* (2016), these producers can be exposed to the market shocks and price volatility. They are important elements for the activity stability in the agglomerate.

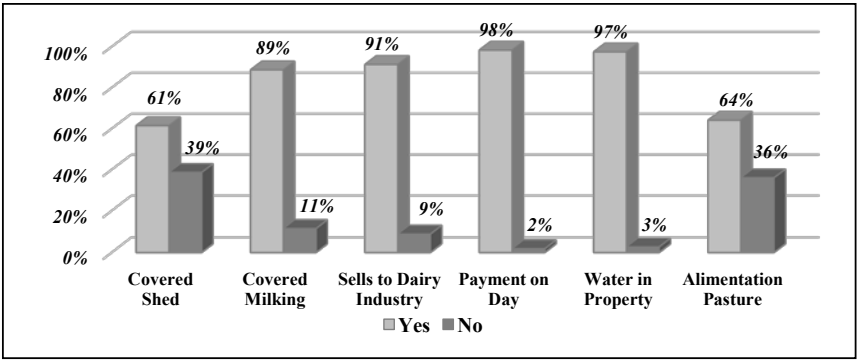
The third grouping just contemplates two variables, whose characteristics allow to define Infrastructure Factor, with excellent factorial loads, above 0.9 so much for covered milking, as for a covered shed. It is an essential element, when considering that 89% of the daily process of milking occurs with more comfort, protected from the bad weather, as well as 61% of the animals remain

Fig. 1. Variables Relative to the Management and Innovation Factor, 2016



Origin: Data of the Research, 2016.

Fig. 2. Variables Relating to Infrastructure, Trade and Environment Factors, 2016



Origin: Data of the Research, 2016.

in sheds during the night or in rainy periods (Fig. 2), minimizing the animal stress and also that of the milk producer.

The fourth grouping, as well as your predecessor, contemplates two variables, related to commercialization and therefore it was nominated as Market Factor. There is only one direct commercialization channel in the agglomerate: dairy industry, the destiny of 91% of the produced milk. The factorial loads are excellent, above 0.9 so much for sale as for the payment, this because 91% of the producers are adjusted to that commercialization channel, then in 98% of cases, the payment is not in delay, giving stability to the planning in the farm (Fig. 2).

The research data reveal that seven dairy industries operate in the agglomerate territory currently, however, the average price of the milk litre paid to the producer is only U$ 0.30, a value below the State average during the previous year (2015), when it was U$ 0.35 for litre, according to data from the Brazilian Institute of Geography and Statistics (IBGE). Another important point is related to the sale price in the retail, which varies from U$ 0.90 to U$ 2.10 for each litre of long life milk, as reveal data of the main research agencies of Mato Grosso, being that one of the lowest value the price practised by the regional brands of milk.

In the sequence complementary to the third, the fifth grouping can be defined as Ambient Factor, because it groups two important variables for animal ambience: the water availability in the property (0.885) and the natural pasture (0.727) in medians condition, primordial food for the animals. The referred factorial loads are explained by the primary data of the research: 91% of the agglomerate farms owns water in adequate quantity, and 64% of these keeps pastures with grasses to the milk production.

Nevertheless, in regard to the farm's headquarters, all own piped water, electricity, mobile telephony and in average the producers dedicate only 4.3 daily hours for the dairy activity. The data of the primary research also reveal that only 4% of the farmers own higher education, 25% high school and 51% primary, incomplete in some cases. However, one datum that requires attention corresponds to the amount of producers (20%) who are in a semi-illiteracy condition because never attended school.

Finally, the last two variables are not grouped, however, it can be asserted that they are related to Infrastructure and Ambient factors. The variable corral with division presents an adequate load factorial of 0.839, imperative for the animals handling in all pasturing procedures or milking: a necessary infrastructure and available in most of the agglomerate farms. In complement to the alimentation, the animals' silage reaches nevertheless the average (0.780), for being an element that interferes positively in the milk productivity, that can be better used by the agglomerate producer's.

4. Conclusion

The adjustment presented by the model to the compiled group of variable assures the robustness of the results and therefore of the imputed interpretations that refer to the current condition of the dairy livestock in the Alto Paraguay agglomerate. Considering that all the factorial loads were positive, kept between recommended minimum (except one: expense for energy 0.483) and the maximum, the first observation consists in the fact that the activity is equilibrated in its structure, no matter what the development stage is. It is an essential element that requires attention, once the agglomerate has received financial and technical support, it does not present nevertheless dissatisfaction points with its current condition.

In respect to the productive system, some problems arise in explicit form, like that of the milk production. With a factorial load below the average, nearer to the minimum wished, it is a limited category to the agglomerate capacity, affecting therefore also the management. This is reflected in the low index of daily milkings (1.35) for an activity that requires a minimum of two and sometimes three recommended milkings per day, with increment up to 65%, considering a superior genetic animal. Associated to this problem, there's the management of the animal's reproductive system that is not so efficient, because only 16% of the producers use the insemination technique. The rest keeps reproducers among the animals, thus making unfeasible any effective planning, limiting to 38% the portion of animals in lactation. Still, the daily average of litres of milk for animal is considerably low.

Furthermore, only one-third of the farms owns mechanical milker; however, the limited productive dynamic allows that even so, the fatigue level is relatively low for an intensive work activity, independent of referred technical support. The second-factor analysis has revealed that, with this limited management, more than the half of producers take annual vacations, and that only 18% have employees. Evidence that the activity do not receive the necessary attention for adequate operation and, because of this, will not reach the wished efficiency levels in the short and medium term.

Another important information revealed by the research concerns the possible causes of the low managerial and productive capacity that remits the scale and quality absence of the milk. The absence of a main brand in the productive sector in Mato Grosso could have a positive side, with regional dairy industry consolidation, in the case the retail is not involved. However, one of the consequences of the low managerial and productive capacity are related to the scale and quality absence of the milk. Nevertheless, one of the main effects is the low price paid for one litre of milk to the producer, because it needs to be lower than that of the main brands in the retail to have access to the best markets. Therefore, the negative impact on the producer's income forces him to search alternative, something already indicated by the average expenses with combustibles, that can transform the dairy livestock in a secondary activity's, as identified by the research in some farms. Despite the problem with the price, the Market Factor presents the activity's best indicators, considering the presence of seven dairy industries in the region, whose payment is up to date in practically all the cases.

Also other two important elements are contemplated by the farms: water in sufficient conditions and pasture availability, besides silage for feeding animals. They are also available ration and mineral salt, a correct and necessary procedure for the activity, nonetheless, this does not cause the wished effects given the low animal genetics. The financial control that could reveal this problem is incipient and made by only 19% of the producers, also explained by the factorial load near the minimum recommended.

They are relatively complex problems and of difficult solution, considering the fact that most producers do not own adequate level of instruction. It is a case in which the definition or the selection of strategies is not an easy task that can be accomplished by the experience of these producers in the activity. The absence of technical assistance turns the process more difficult, materialising one more factor that limits the activity development in Mato Grosso. Finally, the incentive policies managed by the State government since 2008 did not cause the waited effect, a precedent for some reflections on the effect of exogenous actions on the agglomerate. Nevertheless, the dairy livestock keeps a considerable average stream of income among the farms, playing an important role for the food security of the families in the region.

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