

DAIRY CATTLE SUSTAINABILITY USING THE EMERGY METHODOLOGY: ENVIRONMENTAL LOADING RATIO

SUSTENTABILIDADE DA PECUÁRIA LEITEIRA, UTILIZANDO A METODOLOGIA EMERGÉTICA: RAZÃO DE CARGA AMBIENTAL

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The dairy cattle activity in São Paulo State has been depressed in recent years, evidenced by the reduction of 35.47% of dairy herd between 1996 and 2008 (LUPA) and 29.73% in milk production between the census of the IBGE (1995 and 2006). Activity remains in the Agricultural Production Units (UPA) that have adopted more intensive systems of milk production, using animals of high genetic potential, management-intensive rotational grazing or agricultural inputs, and with the objective of profit maximization. In face of environmental pressures, the problem is to know the degree of sustainability of milk production. The objective in this work was to analyze the production of milk from a farm in the municipality of Guzolândia, São Paulo State, during the period 2005/2011, using the emergy methodology to assess the sustainability of system, calculated by *Environmental Loading Ratio (ELR)*. The UPA Alto da Araúna is dedicated to dairy cattle adopting the system of milk production semi-intensive type B; it produces on average 650 liters of milk per day with 45 lactating cows, using 30 ha of pasture with supplemental feed and silage. It has sandy soil, classified as latossol red, yellow, ortho phase, with gently rolling slopes. The UPA is administered with business structure, aiming to profit maximization and minimization of environmental impacts, seeking to maintain economically viable activity and preserving the environment. Currently, administrative decisions have the support of operational control that collects and records information necessary to generate animal and agricultural indexes that evaluate the performance of the UPA, in addition to managerial accounting records that generate cash flow information used to evaluate the economic efficiency of the UPA. The Environmental Loading Ratio ($ELR=N+F/R$) is obtained by the ratio of natural non-renewable resources (N) plus economic resources (F) by total renewable emergy (R). It is an indicator of the pressure of the system over the environment and it can be considered as a measure of stress in the ecosystem. Values of ELR lower than 2 indicate a low-pressure environment (or systems using large areas of the local environment that "dilute" impacts), between 2 and 10 the systems cause a moderate pressure, and higher than 10 means a pressure systems. The mean 5.9 of ELR (Table 1) demonstrated that the production system is moderately impacting over the environment and require interventions to reduce damage at short and medium term. Examples of these interventions could be: better use of natural resources like organic waste as fertilizer, use of intensified pastures, etc. A long-term damage will be greater if nothing is done.

Table 1: Environmental loading ratio (ELR) and data that allowed its calculation

Index	2005/06	2006/07	2007/08	2008/09	2009/10	2010/11	Means
R (sej.ha ⁻¹ .year ⁻¹)	2.24E+15	3.23E+15	2.65E+15	2.18E+15	3.22E+15	2.88E+15	2.73E+15
N (sej.ha ⁻¹ .year ⁻¹)	6.80E+13	7.28E+13	6.43E+13	7.42E+13	5.39E+13	5.16E+13	6.41E+13
F (sej.ha ⁻¹ .year ⁻¹)	1.57E+16	1.65E+16	2.02E+16	1.24E+16	1.56E+16	1.44E+16	1.58E+16
ELR	7.03	5.12	7.66	5.70	4.86	5.00	5.90

Key words: decisions, milk, sustainability index, interventions, reducing the impact.