Case study of agricultural production: cost effective operating of sugarcane plantation (*Saccharum officinarum*) CB 47-355 variety to animal feeding in Porto Velho, Northern Brazil

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Introduction Nowadays, Brazil is the largest sugarcane producer, contributing with 40% of the world production (700 MT in 2009), occupying about 9.7 million hectares with the culture of sugar cane. Furthermore, the country is a worldwide reference concerning to technologies for production of sugarcane *Saccharum officinarum*, especially used to table sugar, ethanol and in smaller scale, spirits such as rum and "cachaça" (fermentation and distillation of the stem juice) (Oliveira *et al.*, 2012; Scortecci *et al*., 2012). Those researches and national technologies have been allowing to lengthen the useful life of the sugarcane plantation, as well as to use more efficiently the inputs and labor, increasing the competitiveness and sustainability of the system. On small farms in Northern Brazil, the chopped sugarcane stalks are widely used as cattle feed during dry season when pastures are not available for grazing, because a mixture of sugarcane, urea and sulfur constitutes a source of energy and protein. Differently from other tropical grasses, sugar cane increase the energy content with advancing age (Caione et al, 2012). The maturation of sugarcane in Southeastern Brazil occurs naturally at beginning of May, peaking from September-October (Deuber, 1988; Galdiano, 2008), yet lack information on soil and climatic conditions of Northern Brazil. Although the average productivity of sugarcane Brazilian oscillates 80-90 t fresh matter per hectare, adopting an appropriate management an fertilizing can be achieved yields higher than 150 t of fresh matter/ha (Oliveira et al, 2012). However, technological innovations are dynamic and there is a need to quantify the efficiency and cost of production, to detect bottlenecks to ensure feasibility for the dairy farmer. The aim of this study was to evaluate costs of sugarcane plantation of CB 47-355 variety, in plant-cane crop, under conditions of Northern Brazil, in Porto Velho.

Materials and Methods The costs of sugarcane production were evaluated in an experimental area of Embrapa Rondonia, Porto Velho city, located in Amazonia, State of Rondonia, Brazil. The sugarcane variety CB 47-355 was planted in November 2012 in the area of 0.43 ha allocated to livestock feed with use of termiticide (tiametoxam 141 g/kg) and fungicide (azoxistrobine 200 g/L+ciproconazol 80 g/L). After plantation, it was fertilized in February and March, desiccated pre (Paraquat dichloride 276 g/L+ Oxyfluorfem 240 g/L) and post emergence (Tebuthiurom 500 g/L). The fertilizer doses were chosen based on soil sample analysis (20 cm depth) to reach saturation of 60% of total bases. The rate of 93-180-166 kg/ha of formulate (N-P_2O_5-K_2O), based on the yield of 120-150/ha of fresh matter, in according to the tables of IAC. The Operating Cost Effective (COE) provides adequate financial return in relation to outlay (Moreira and Bonizio, 2012) and was calculated about the costs of sugarcane plantation until early 2013 year. The costs were collected through exploratory research, and the procedures and data collection defined as a case study (Oliveira et al, 2012).

Results and Discussion During plantation of sugarcane, the items that were more costly included chemical fertilizers (N-P-K+FTE), expenses with plowing and harrowing, application of limestone, sugarcane seedlings (cut on own farm), furrowing for planting and limestone and totalized 75% of CEO (Figure 1). The cost was divided by two mainly categories: services and operations (labor in unity of days-worked, d/h; mechanization in unity of hour-tractor or hour-machine, h/m) equivalent to 50.28% of the COE, already spending on agricultural supplies were of 49.72%. The activities itemized as: soil preparation/treatment; plantation of sugar cane; chemical treatment of soil and plants (herbicide, termiticide, fungicide); fertilization, fertilizer (phosphate triple, urea, potassium chlorate, FTE-micronutrients mix), limestone, etc.

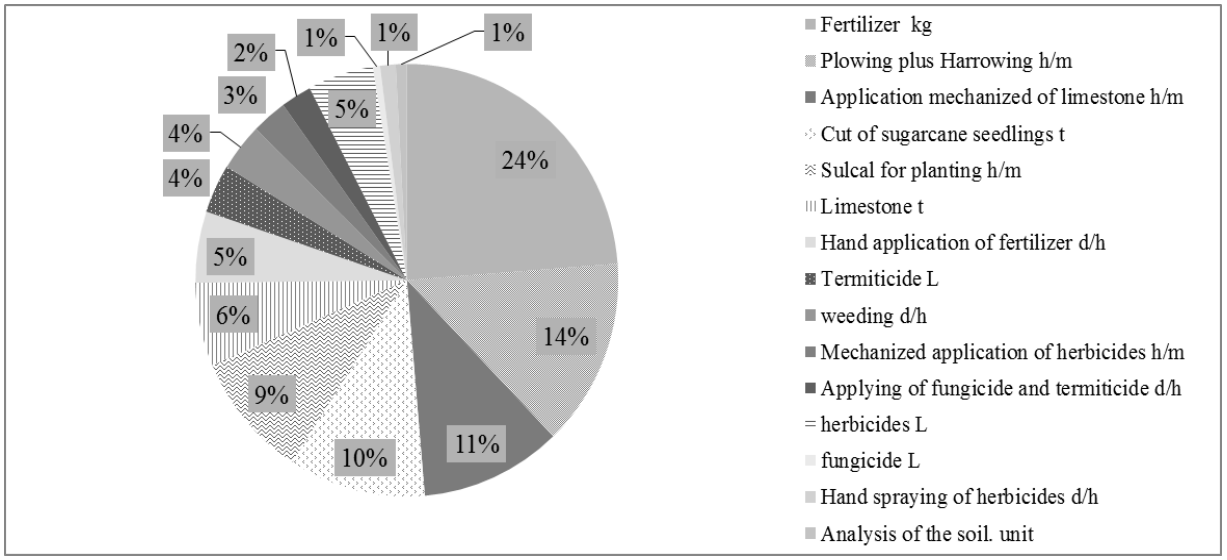

Figure 1 Percentual cost effective operating of implantation of sugarcane plantation in 0.43ha

Because this case study refers to small area, similar to the small milk producer, the COE this study (R$ 6,852.06/ha) were similar to those found by Moreira and Bonizio (2013) for other regions, of R$ 6,333.00/ha, three times higher for small farmers, because the large area has lower costs due to economies of scale. One point that can be improved is the regulation of herbicide application, once were applied as 135% of the recommended dose, one can saved the equivalent of 35%. The training of workforce had so much impact on costs of operations and the increasing scale of production can also optimize costs, since dilute the time used in mechanized operations (tractor).

Conclusion Therefore, it is concluded that the production scale, technical management and training of the workforce are aspects that can improve the results of small crops of sugar cane in Porto Velho.