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Development of a mathematical model to estimate the swine production cost in Brazil

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Brazil is the fourth largest pork producer and exporter in the world, and the continuous growth of the sector is a result of technological improvement in nutrition, sanitary, welfare, handling, and other areas. However, the greatest weakness of the Brazilian independent swine production is that most farms have deficient internal controls and are managed empirically, unable to obtain the information that guides decision-making: the cost of the pig produced. The aim of this study was to estimate the swine production costs in representative swine farms of the São Paulo state and assess the impact of the main items on the cost of a market hog. To estimate the costs, a mathematical spreadsheet model developed by the researchers was used. All costs were considered following Economic Theory and allocated in the order: variable costs (VC); fixed costs (FC); and cost of remunerating capital and land, also knowns as opportunity cost (OC). Total cost (TC) is the sum of variable costs, fixed costs, and operational costs. The representative swine farms were delineated from case studies carried out at São Paulo state in 2019 and 2020. Two pig farm models were delineated to calculate the production costs: one with 274 sows and slaughter capacity of 158 market hogs per week ($ICPS_{500}$) and another with 1,750 sows and slaughter capacity of 1,015 market hogs per week ($ICPS_{2000}$). The prices of the items that compose the cost are from the spot market and refer to February 2021. The total cost per kilogram produced was US$ 1.51 for $ICPS_{500}$ and US$ 1.39 for $ICPS_{2000}$. The cost of feeding the herd was the one that most impacted the total cost, representing 69.1% for the $ICPS_{500}$ and 73.6% for the $ICPS_{2000}$. In the $ICPS_{500}$, VC, FC, and OC represented 80.0%, 16.1% and 3.9%, respectively, and for $ICPS_{2000}$ represented 83.5%, 12.7% and 3.8%, in the same order. It is important to note that opportunity costs are an activity cost, however, if the factors are proper, the OC becomes an income for the farmer, since it is composed of the remuneration of the capital invested in the activity, whether this is fixed or not. The calculation model developed helps the producer to better decision making concerning his farm, through the management and control of production costs.

Keywords: pig farm, livestock, economics, management