v. 3, n. 11, 2023

Journal of Agricultural Sciences Research

ECONOMIC WEIGHTS OF IMPORTANT PRODUCTIVE VARIABLES IN BELLY SOW FARMS

Domínguez Olvera Daniel Alonso
Faculty of veterinary medicine and zootechnics, Universidad Nacional Autónoma de México
Ciudad Universitaria, Ciudad de México, Mexico
ORCID: 0000-0002-7220-0242

Herrera Haro José Guadalupe
Genetic Resources and Productivity Program - Ganadería, Postgraduate College
Texcoco, Estado de México, Mexico
ORCID: 0000-0002-6177-8647

Bárcena Gama José Ricardo
Genetic Resources and Productivity Program - Ganadería, Postgraduate College
Texcoco, Estado de México, México

Ortega Cerrilla Maria Esther
Genetic Resources and Productivity Program - Ganadería, Postgraduate College
Texcoco, Estado de México, Mexico
ORCID: 0000-0002-0039-9424

Martínez Castañeda Francisco Ernesto
``Instituto de Ciencias Agropecuarias y Rurales, Universidad Autónoma del Estado de México``
Toluca, Estado de México, Mexico
ORCID: 0000-0003-0168-921X

Rouco Yáñez Antonio
Facultad de Veterinaria, Universidad de Murcia
Murcia, Spain

Abstract: The objective of this study was to obtain the economic weights (PE), important for the selection indices, of different characteristics of importance in sow sow farms. With the positive approximation system, the PEs were obtained for the functions of maximum benefit and maximum efficiency. Litter size at birth has a low PE and, depending on the profit function, may be negative. Obtaining the PEs is important not only to perform an economic prioritization during the selection of individuals, but also to determine how they affect the system.
Keywords: economic value, profit function, selection indices.

INTRODUCTION

Groen (1999), highlights that genetic improvement programs, like any other management area, consist of the planning, implementation and evaluation of improvement strategies, which in turn, is a process of continuous refinement and identification of improvement opportunities. which gives rise again to planning and implementation, in short, is an iterative process (Cruz et. al., 2015). These programs aim to simultaneously increase various traits of interest, prioritizing each one for its economic value (Toro and López-Fanjul, 2007). The selection of the animals, therefore, will be carried out to maximize the profitability of our company in the following generations and, according to the methodology used, to value and estimate the relative economic importance of the characters. The objective of this study was to obtain the economic weights of different productive and reproductive variables of interest, in a womb sow farm.

METHOD

Descriptive statistics were obtained from a farm with 245 sows and information from 1145 farrowings, and economic evaluations applicable to the production systems were made. The method used to obtain the economic weights was, within the objective methods, the positive approximation system or data evaluation (Blasco, 1995), this consists of mixing, through a multiple linear regression, the economic and technical data, where the economic weights are the regression coefficients (Groen, 1989). Based on the definition of aggregate genotype, the economic value of a trait i is defined as the effect of a marginal unitary change in the genetic level of said trait i on the objective function (that is, the profit function), holding constant the rest of characters included in the aggregate genotype (Ramón et. al., 2005). The economic value (B) is defined as the difference between income minus costs: B=I-C, where I and C are the income and costs associated with the increase in one unit of the mean for character i, respectively. In this sense, the economic weights were obtained in two ways, where the way of expressing the benefit function varies, in one as income minus costs, where it implies maximizing the benefit that is the interest of companies and producers, and the other, as revenue over costs, where economic efficiency is maximized.

RESULTS

VARIABLES

The variables that were considered to obtain the economic weights are directly related to the level of production, reproductive efficiency and rusticity of the sow. These variables are presented in Table 1, along with their descriptive statistics.

The size and weight of the litter at birth, TCN and PCN, respectively, are variables directly related to the level of production of a farm, they are important in genetic improvement, however, they are not dominant over the economic indicators, since they are influenced by other variables, such as mortality, feed efficiency, and some others that affect their productive efficiency throughout their lives. Size and weight of the litter at weaning are a reflection of the maternal abilities of the sows, when compared to birth (Malavé et. al., 2008). The farrowings per year, PPP, are key in the economic results of the production units, since they have a direct effect on production and therefore on income. The resistance to diseases and the probability of having problems at farrowing are a reflection of the sow's ability to adapt, one allows us to economize on the treatment of diseases and the other allows us to reduce the number of stillborns.

ECONOMIC WEIGHTS

Next, in Table 2, the economic weights of the different variables are shown, according to the way of assuming the benefit. Contrary to what was expected, with the optimal benefit function, the TCN variable presents a low and negative economic weight, likewise, the probability of childbirth problems, presented a negative weight, however, the latter is to be expected, since that the presence of this variable represents an increase in mortality at birth. On the other hand, under the same benefit function, we have that the PCN variable has considerable weight over the maximum benefit, followed by PCD, a variable directly related to PCN, with a much lower value, and with a lower but positive value, the TCD. The PPA also has a strong effect on the maximum profit. Unlike the maximum profit function, the economic weight of the TCN is positive, although very low, and resistance to diseases is negative; the PCN continues to have the greatest weight, followed by the PCD and

Variable	Average	Variation	Standard deviation	Coefficient of variation
TCN	10.27	5.31	2.30	22.43
PCN	14.59	11.10	3.33	22.83
TCD	9.09	3.54	1.88	20.69
PCD	56.10	104.77	10.24	18.24
PPA	2.50	0.09	0.31	12.40
RE	0.89	0.01	0.13	14.60
PROB	0.23	0.02	0.15	65.37

Table 1. Descriptive statistics of the economically important productive variables of belly sows. Litter size at birth (TCN), litter weight at birth (PCN), litter size at weaning (TCD), litter weight at weaning (PCD), farrowing per year (PPP), disease resistance (RE) and probability of delivery problems (PROB).

Variable	Role of maximum profit	Role of optimal profit
TCN	-0.016	0.002
PCN	8.071	0.694
TCD	0.465	0.035
PCD	1.962	0.168
PPA	1.742	0.128
RE	0.033	-0.006
PROB	-0.544	-0.047

Table 2. Economic weights of the study variables according to each function. Litter size at birth (TCN), litter weight at birth (PCN), litter size at weaning (TCD), litter weight at weaning (PCD), farrowing per year (PPP), disease resistance (RE) and probability of delivery problems (PROB).

PPA; the probability remains negative and the TCD has a low value, compared to the other variables.

CONCLUSION

The economic weights of the study variables were not homogeneous. In some cases they were up to eight times heavier.

The size of the litter at birth has a low economic weight, and according to the profit function it can be negative.

Obtaining the economic weights is important not only for economic prioritization during the selection of individuals, but also allows determining, according to the benefit function, its effect on the system.

REFERENCES

Blasco, A., 1995. **Los pesos económicos en la mejora genética**. ITEA, Vol. 91ª N° 2, pp. 59-79.

Cruz Flores, D. J., 2016. **Estimación de pesos económicos en la producción intensiva de cuyes (cavia porcellus) productores de carne (Tesis doctoral)**. Universidad Politécnica de Valencia. Valencia, 2015. Pp. 15-45.

Groen A., 1999. **Workshop on Developing breeding Strategies for Lower Input Animal Production Environments**. Breeding goal definition. Bella, Italy. Pp 25.

Groen, A., 1989. **Cattle breeding goals and production circumstances**. Thesis, PhD. Department of Farm Management and Department of Animal Breeding, Wageningen Agricultural University, Wageningen, The Netherlands. Chapter 1: 12-23.

Malavé, T., Alfaro, M., & Hurtado, E. (2007). **Efecto del número de partos, tamaño y peso de la camada al destete sobre el intervalo destete-estro en cerdas**. Revista Unellez de Ciencia y Tecnología, 25, 10-15.

Ramón, M., Legarra, A., Pérez-Guzmán, M. D., & Ugarte, E., 2005. **Obtención de pesos económicos para selección por rentabilidad**. ITEA, Vol. Extra N° 26. Tomo I, pp. 129-131.

Toro, M., López- Fanjul, C., 2007. **Genética y genómica en acuicultura**; diseño de programas de mejora genética en acuicultura. Ed. CSIC. Pag. 189.