

TECHNOLOGICAL GAP AND PRODUCTION INDICATORS OF THE COW-CALF SYSTEM IN AGOSTADEROS OF SIERRA MOJADA AND OCAMPO, COAHUILA, MEXICO

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Abstract: With the objective of determining the technological gap and productive indicators in the cow-breeding production system under extensive conditions, the present study was carried out with producers from 11 locations in the municipalities of Sierra Mojada and Ocampo, Coahuila, Mexico. To this end, a survey of producers in 47 Family Production Units (UPF) was carried out using a structured questionnaire, with quantitative and qualitative variables of aspects of the producer, the production unit, the rangeland, feeding, reproductive-genetic, health, productive, infrastructure, equipment and marketing. The selection of the UPF was carried out by non-probabilistic sampling based on the list of members of a Territorial Development Project. The sample was determined with a precision level of 95% and assigned error of 10%. The information was analyzed using descriptive statistics (mean, average, standard deviation, minimum and maximum) with the Microsoft Excel program and the productive indicators using formulas with the data obtained from the UPF. 86.1% is dedicated to the cow-calf system, with an average size of 871 ha-1, ejidal property in 87% and average herd size of 61 heads/belly. Producers are 60 years old on average and 63% have completed primary and secondary school. 98% do not receive technical assistance, 100% without organization, 91% without financing and market and commercialization problems. The average technological gap is 42.5%: 62.3% in food, 54.0% in rangelands, 52.3% in reproduction-genetics, and 1.3% in health. Productive indices, of 0.54 offspring produced/cow calved, 3.54 kg of meat/ha and 56.3 kg of meat produced/U.A. It is concluded that the low productivity of the production system is due to technological backwardness, low educational level, lack of technical training, lack of economic resources and lack of organization; the latter, for the management

of infrastructure, machinery, equipment and marketing of products and supplies.

Keywords: Cow-breeding, technological gap, productive indicators.

INTRODUCTION

In Mexico, agricultural units are primary economic activities, they are characterized by representing 57% of the surface of the agricultural and fishing sector and, without sustainable development; as a consequence of the low growth of activity, the persistence of poverty among rural families, the degradation of natural resources, the unfavorable economic environment and the existence of a weak institutional framework to generate policies that contribute to the development of the sector. (FAO, 2012). The achievement of productive efficiency and sustainability of the bovine meat system under rangeland conditions depends on factors related to the animals and their environment, as well as those related to the decision-making of the owners or administrators of the ranches. The latter being where the factors related to the use of technologies are included, which affect their economic success (Villaret, 2004). The most common way to measure the efficiency of the cow-calf system has been with technical efficiency indicators, such as percentage of pregnancy, weaned calves, mortality and weaning weight; and economic, such as the cost of the weaned calf, cow maintenance, generating a replacement, income and total profits. At the same time, they consider including weight and food consumption of the progeny, weight of the cow at weaning, and weighting factors for weight and food of the mother and progeny (Báez et al., 1999; Callejas et al., 2014). Areas that must be strengthened as they are a fundamental part of improving the competitiveness of the company (Villaret, 2004), since these establish direct and indirect technical exchange so that, without a doubt,

ranchers adopt new technologies, improve technically and/or organize better (Salinas et al., 2016). However, Family Production Units (UPF) in the rural sector of high and very high marginalization localities face problems of low productivity, sustainability and technological lag that affects natural resources and the well-being of livestock families (FAO, 2012), due to the limited consideration in federal programs and that due to this, in 2019, the federal government made changes to the operating rules of the programs in support of said sector, because despite the support and extension programs provided in previous years to other private sectors do not show real changes, which must be reoriented (Suarez and López, 2008). Therefore, the objective of this study was to carry out a diagnosis to determine the technological gap and the productive indicators, in order to search for the causes and/or technical, climatic, socio-economic and market factors that affect the system. thereby allowing planning of actions for technological intervention in the short, medium and long term, through technical support and resource management for the competitive improvement and well-being of families.

MATERIALS AND METHOD

The study was carried out in 2020, with producers from 11 locations in the municipalities of Sierra Mojada and Ocampo, Coahuila, Mexico. The main climate in the study area is a BWhx (very dry semi-warm subtype), which is characterized by little rainfall all year round, with a precipitation regime of 100 to 500 mm per year; with an average annual temperature of 17.9 oC and a monthly average of 22 oC. The soils are of the xerosol, regosol and yermosol type with medium texture. The vegetation corresponds to thorny crasiosulifolio scrub, parvifolio unarmed scrub, subinermes medium scrub

and halophyte grassland (COTECOCA, 1979). Range coefficients range from 9.7 to 60 ha/Animal Unit (A.U). in Sierra Mojada and from 9.7 to 80 ha/U.A. in Ocampo (SAGARPA, 2010). To obtain information from the UPF, a questionnaire titled "Rural Development" was formulated, structured by INIFAP and SIAP, which included quantitative and qualitative variables of aspects of the producer, the production unit, and management. of the rangeland, feeding (forage supplements and concentrated supplements), reproductive-genetic, health, productive, infrastructure, equipment and marketing. The questionnaire was applied through interviews with producers during direct visits to the UPF. Its selection was carried out by non-probabilistic sampling based on the list of members of PRODETER (Territorial Development Project). The sample size (47 surveys) was determined using the Rojas (2013) technique, with a precision level of 95% and an assigned error of 10%. The capture of the field surveys was carried out physically and digitally, using pre-established records and the Comprehensive Mobile Capture System (SIAP, 2019). The information collected was analyzed using descriptive statistics (mean, average, standard deviation, minimum and maximum) with the Microsoft Excel program. The productive indicators were determined using formulas with the data obtained from the UPF.

RESULTS AND DISCUSSION

86.1% of the UPF are dedicated to rangeland livestock activity, under the cow-calf system; The size of the UPF was 871 ± 739 ha, with a herd size of 61 ± 48 heads; 65.6% of the UPF have crossbred cattle, of two to three breeds such as: Charolais, Beffmaster, Brangus, Angus, Brahman and Santa Gertrudis. 87% of the land is ejidal and 77% of the producers have their own land, 92.1% of the owners are men, know how to read and

write, with an average age of 60 years. 87.2% began primary and secondary education and 63.8% completed it satisfactorily. Only 8.9% of the family participates in livestock activities. 98% do not receive technical assistance, 100% do not belong to any organization and 91% use their own resources to carry out their activities.

Figure 1 shows the Technological Level (NT) of the production process of the UPF system; on average, 21% of the UPF apply certain technologies and/or technical practices (activities) in each of four management areas. The area with the most technology (59.2%) is the sanitary area and the least (1.5%) is the rangeland area; and between the two, are the feeding management area and the reproduction and genetics area with values of 12.3 and 10.9%, respectively. In this regard, Crowe et al., (2018) point out that nutrition is an essential factor in conditioning the reproductive physiological aspects that determine fertility, and in agreement, Ghoribi et al., (2012), failures in fertility reflect increased of open days, abortions, stillbirths and infertility, represented in economic losses (Chamba et al., 2017).

Which according to the classification reported by Cuevas et al. (2013) in Sinaloa, the NT in health of the present study is high, being $\geq 17\%$, for the feeding and reproduction-genetic areas, they are of medium to low use being in the range ≥ 9.0 and $\leq 17\%$ and, the rangeland area is low because it is less than ≤ 9.0 . When relating the values of the NT with the felt problem (PS) that afflicts the producer in each of the management areas (Figure 1), the differences obtained between both values of 42.5% (NT of 21% and PS of 63.5%) at a general average level, of 62.3% (NT of 12.3% and PS of 74.6%) in the food area, of 54.0% (NT of 1.5% and PS of 55.5%) in the rangeland area, of 52.3% (NT of 10.9% and PS of 63.2%) in the reproduction-genetic area and 1.3%

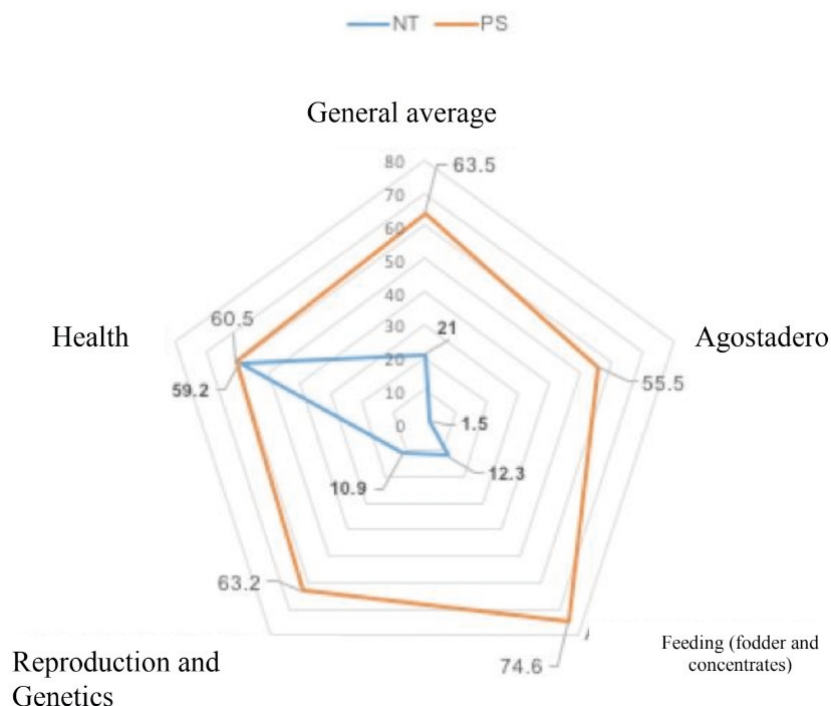


Figure 1. Technological Level (NT) and Felt Problems that afflict the producer (PS) by management area in the UPF with cow-calf system in rangelands.

Indicator	Average value	
	UPF of Sierra Mojada and Ocampo	Chihuahua Ranches
Calves produced/cow calved (Number)	0.54	0.61
Total of meat produced/ UPF (t)	3.09	27.40
Meat produced/ha (kg)	3.50	7.65
Meat produced/cow (kg)	71.70	115.00
Produced meat/U.A. (kg)	56.30	78.20
Kg MS available/kg of meat produced/cow	35.60	63.50

Table 1. UPF productive indicators with the cow-calf system under rangelands of Sierra Mojada and Ocampo, Coahuila and Chihuahua.

(NT of 59.2% and PS of 60.5%) in the health area; indicate the existence of the technological intervention gap to be undertaken in them.

The gap between the NT and the PS in the rangeland area is mainly due to the lack of good grazing management practices, such as the adjustment of animal load and use of grazing systems, which exacerbate the forage shortage reported by the 85% in the face of prolonged droughts as reported by 97% of producers.

In the feeding area, it is due to the little use of forage as a complement and the low use of supplementation of concentrates due to their scarcity and their high costs in critical times.

In the area of reproduction and genetics, the non-existence of reproductive practices was observed, such as: pregnancy detection, evaluation of stallions and free mating carried out by 100% of the producers, except for the use of improved breeds in the case of genetics, for example. Therefore, 97% of producers report having few births per year and 82% have long intervals between births, 68% report having a high percentage of abortions, little knowledge in the management of reproduction and crossing, and 92% have problems with adaptation of livestock to the conditions present in their production unit.

In health, the scarce or inadequate coverage of vaccination programs, deworming and health campaigns stands out, reported by 87% of the producers, due to the above, the high percentages of abortions expressed by 68% of the producers.

The productive indicators are shown in table 1, which are low according to those reported by Báez et al. (1999) in 10 privately owned ranches with a cow-calf system in rangelands in the state of Chihuahua.

It is important to highlight that, due to the low technological level, as well as the problems of forage shortage in the rangeland and insufficient supplementation, each womb

produces one calf every two years. Likewise, there are 35.6 kg of available dry matter/kg of meat produced/cow with an animal load of 37.6 ha/U.A. in bushes in good condition (Table 1). Of the aforementioned indicators, the indicator of kg of meat produced/A.U. is more efficient than the indicator of kg of meat produced/cow, because it is based on the consumption of forage per animal and not on the number of heads (Báez et al, 1999).

In the social, market and commercialization aspects, 64.7% suffer from cattle rustling, 94.1% have market problems due to inadequate roads. For 59.4%, marketing must be direct to the consumer, for 29.3% under contract with the industry, for 49.3% the product must be more widely disseminated, for 29.3% it is important to improve the quality of the product and for 56% to improve the price of the product. Which partially coincides with what was reported by Osuna (2003), who mentions that the most important problems of the Agricultural Sector of Mexico are: few or no births of offspring per year, droughts, training, technology, animal health and disadvantageous conditions of marketing of meat products at the state and national level.

CONCLUSIONS

The low productivity of the production system is due to technological backwardness, low educational level, lack of technical training, lack of economic resources and lack of organization; the latter, for the management of infrastructure, machinery and equipment and marketing of products and supplies. It is recommended to establish a training and technical support program that addresses the main technological limitations.

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REFERENCES

- Báez, G. A. D., Reyes, L. G., Melgoza, C. A., Royo, M. M. y Carrillo, R. R. (1999). **Características productivas del sistema vacacría en el estado de Chihuahua**. *Téc. Pecuaria*. Méx. 37(2):11-24.
- Callejas, J. N., Aranda, G. H., Rebollar, R. S. y de la Fuente, M.M. L. (2014). **Situación económica de la producción de bovinos de carne en el estado de chihuahua**, Mexico. *Agronomía Mesoamericana*, vol. 25, núm. 1, enero-junio, 2014, pp. 133-139 Universidad de Costa Rica Alajuela, Costa Rica
- Chamba, H., Armijos, R. y Vidal, P. 2017. **Estudio de los parámetros reproductivos de hatos ganaderos de la parroquia Valladolid-Palanda- Zamora Chinchipe**. *Control de Biotecnología*, 6, 48–56.
- COTECOCA. (1979). **Comisión técnico consultiva para la determinación de los coeficientes de agostadero del estado de Coahuila**. SARH, Mexico, D.F. 241 p.
- COTECOCA. (2010). **Coeficientes de agostadero del Estado de Coahuila**. Mapa. Estado de Coahuila, Mex. <http://sites.google.com/a/sima-Coahuila.com/agostaderos-de-Coahuila/> (Consultado el 10/09/2019).
- Crowe, M. A., Hostens, M., and Opsomer, G. (2018). **Reproductive management in dairy cows - the future**. *Irish Veterinary Journal*, 71, 1. doi: <https://doi.org/10.1186/s13620-017-0112>.
- Cuevas, R. V., Baca M. J., Cervantes, E. F., Espinosa, G. J. A., Aguilar, A. J. y Loaiza, M. A. (2013). **Factores que determinan el uso de innovaciones tecnológicas en la ganadería de doble propósito en Sinaloa, México**. *Revista Mexicana de Ciencias Pecuarias* 4(1): 31-46.
- FAO, (2012). **Diagnóstico del sector rural y pesquero: Identificación de la problemática del sector agropecuario y pesquero de Mexico 2012**. 2012. FAO. Capítulo III. P.7 y 8.
- Ghoribi, L., Hireche, S., Chibat, M. (2012). **Study of some reproductive parameters in bovine dairy farms in the east of Algeria**. *Investigación Ganadera Para El Desarrollo Rural*, 24(2).
- INEGI. (2008). Instituto Nacional de Estadística, Geografía e Informática. **Anuario estadístico del estado de Coahuila**. pp. 240.
- Osuna, S. (2003). **La problemática de la ganadería en México**. En: IX Encuentro Nacional de Legisladores del sector Agropecuario de México. Nuestro Congreso. Órgano Informativo del Congreso del Estado de Sinaloa. p. 86-90.
- Rojas, S. R. (2013). **Guía para realizar investigaciones sociales**. 38a edición Plaza y Valdez S.A. de C.V. México, D.F. 437 pp.
- Salinas, G. H., Valle, E. D., de Santiago, M. Á, Veliz, F. G., Maldonado, J. A., Vélez, L. I., Torres, D., Requejo, M. I. y Figueroa, U. (2016). **Análisis descriptivo de unidades caprinas en el suroeste de la región Lagunera, Coahuila, Mexico**. *Interciencia* 41(11):763-768.
- SIAP. (2019). Servicio de Información Agroalimentaria y Pesquera. **Manual para el diagnóstico de los Proyectos de Desarrollo Territorial (PRODETER)**. Guía para el uso y manejo de la aplicación móvil 'SIAP-Desarrollo Rural'. 113 p.
- Suárez, D.H y López, T.Q. (2009). **La ganadería bovina productora de carne en Mexico. Situación actual**. Departamento de Zootecnia, Universidad Autónoma Chapingo, Mexico. <http://agrinet.tamu.edu/trade/papers/hermilo.pdf>. Consultado 16/07/2021).
- Villaret, A. (2004). **Las redes de ganadería y los proyectos de “asesoramiento y comunicación colectiva”, metodologías y experiencias francesas para un enfoque moderno de la transferencia de tecnología**. En: memoria del Simposiums internacionales y conferencias magistrales de la XL Reunión Nacional de Investigación Pecuaria. Mérida, Yucatán, del 22 al 26 de noviembre de 2004, 15-33 p.