"Factors affecting technological adoption in beef cattle in Corrientes province, Argentina"

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I. Introduction

The province of Corrientes covers an area of 88,199 km2. Livestock occupies 5,644,736 hectares in this province, which represents 64% of the provincial area (Sampedro and Calvi, 2016) Beef cattle in Corrientes is estimated in 4.5 million heads (SENASA, 2018). As total Argentinian stock is 54.8 million heads, Corrientes takes the fourth place with 8.5% share (SENASA, 2018) and contributes with 10.4% of the country's cows (Calvi, 2017). Sampedro and Calvi *op. cit*. calculate a productive orientation index (IOP[1]) for Corrientes province of 0.3; which shows that the main activity is breeding - wintering. Although there is a significant development of available technologies in Corrientes to improve production rates, there are significant gaps in production between farmers who adopt technology and provincial or regional average production and weaning rates are low, between 48% and 62%, according to provincial livestock region. Identification of basis and nature of the determining factors regarding technology adoption becomes an issue of particular interest in order to design specific intervention strategies. In this sense, since 2010 researchers at INTA have been studying the phenomena in different

[1] Index of productive orientation (steers + young bulls) / cows, where less than 0.20 predominates breeding, between 0.21 and 0.40 is breeding - wintering, between 0.41 and 0.60 is wintering - breeding and greater than 0.60 is wintering.

productions and regions of the country. In the beef cattle case in Corrientes, the following objectives were raised.

Main objective: Identify the determining factors in technology adoption for bovine livestock production for meat corresponding to the 500-3000 head stratum (per livestock establishment) in the province of Corrientes.

Specific objectives

• Establish the critical technologies on which to deepen research of adoption factors.

• Identify, analyze and link the causes that affect adoption of critical technologies through a qualitative approach.

• Quantify technology adoption factors through producer survey.

• Make contributions to institutional and inter-institutional intervention.

II. Methodology

Definition of the population and study area. population is defined as livestock producers that have between 500 and 3000 heads of cattle and are mainly dedicated to raising cattle with an IOP <0.40 in two Homogeneous Agroecological Zones (ZAH): El Malezal, Departments of Santo Tomé, Gral. Alvear and Gral. San Martín; and Afloramiento Rocosos (Rock Outcrops) and Monte de Ñandubay, Departments of Mercedes and Curuzú Cuatiá, province of Corrientes.

Technological Profile and Identification of critical technologies. The methodology of technological profile, developed by INTA, relies on participatory workshops with livestock sector professionals. The technological-productive situation is characterized by homogeneous agroecological zone (ZAH), being classified into three technological levels (NT): low (NTB), medium (NTM) and high (NTA), based on yields associated with technological packages implemented at farms. Additionally, (also by NT), the degree of

technology adoption for each of the technologies indicated is estimated (Adoption rates) (Cap *et al.,* 2010). This diagnosis phase allows detecting *productivity gaps*: percentage variance between productivity of the low technological level and the high technological level, not explained by agro ecological issues. As a final product of these workshops, *critical technologies* are identified, defined as those that, when adopted, generate significant impact on productivity, quality, social and environmental aspects (Giancola *et al.,* 2012).

Qualitative stage: focus or discussion groups' techniques were used at fieldwork with producers, as they are valuable research tools aimed to obtain knowledge about a social event or a focused issue previously defined by the researcher. It is useful for exploring knowledge, practices and opinions, in not only the sense of examining, what the group consulted thinks but also how and why they think what they think (Kitzinger, 1995).

At this stage with Corrientes farmers, we brought back the critical technologies form (used in previous stage) as main input. 9 focus groups (91 farmers) were carried out in five locations in the province of Corrientes during 2011.

Quantitative Stage: qualitative results were deepened by applying quantitative method. It is important to combine both types of studies when inquiring about the determinants of the adoption of certain technologies, since it may reveal valuable and complementary information. Dowbley (2012) states: "If for the design of the form only the vision of the technicians had been considered, biases and errors in the interpretation of the survey results would have been generated. Likewise, the qualitative study also allowed us to find a suitable language to ask farmers questions". Agricultural establishments (EAPs) of the ZAH Malezal (departments General Alvear, Santo Tomé, San Martín and part of Mercedes) and the ZAH Afloramientos Rocosos (part of the Mercedes department) of the province of Corrientes were selected.

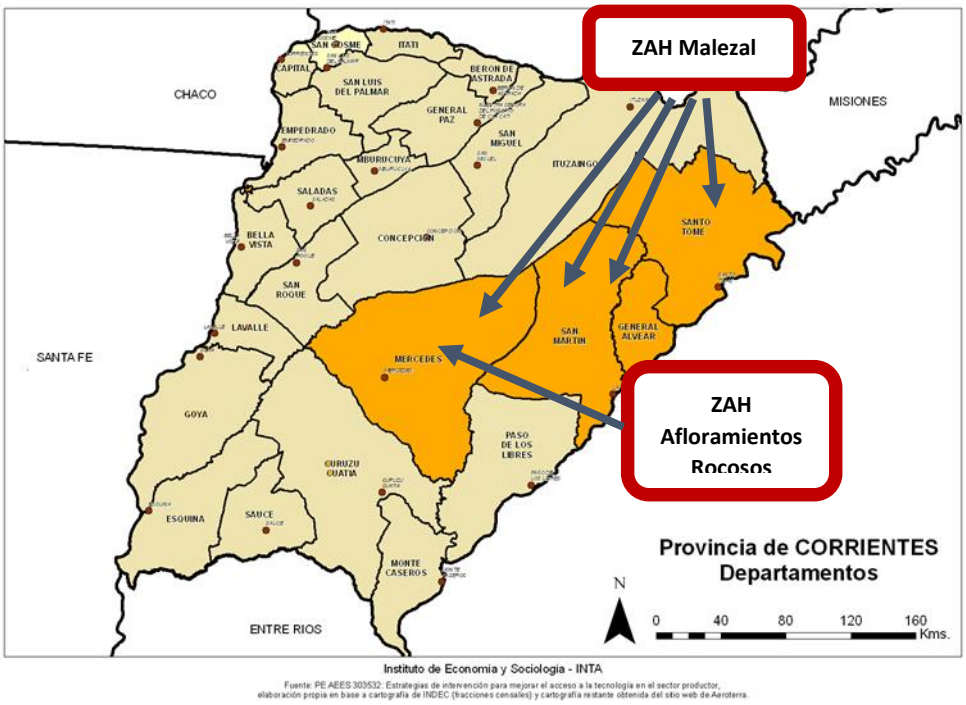

Figure 1. Selected departments. Province of Corrientes

Survey design. The measuring instrument chosen is a semi-structured form organized by chapters that seeks to reveal basic data about the farm, the farmer, the decision maker and the critical technologies involved in each stage of the production process. Results obtained in focus groups carried out during the qualitative stage were taken into account to design the form. Single and multiple spontaneous questions were included (no answer options were given in advance). Sampling frame: SENASA [2] registration. Statistical unit. Livestock farmers who have between 500 and 3000 heads and are mainly dedicated to raising cattle (IOP <0.40). For the sample design, the systematic method of Madow was applied with proportional probability to size.

Fieldwork was carried out between September 2012 and May 2013 (reference period for livestock production set from July 1, 2011 to June 30, 2012. Total surveys carried out 104 (over a total population target of 226 farms.).

[2] National Agrifood Health and Quality Service Argentina

III. Findings

Technological Profile and identification of critical technologies. Productivity gaps were obtained. Findings shows that within the same agro-ecological zone (ZAH) there are livestock establishments with yield differences (in kg / ha / year) up to 100% and 125% (Giancola *et al*., 2013). 18 critical technologies were selected: set aside in natural grassland, carrying capacity adjustement, service parking in three months, age of entorement, prevention of venereal diseases, pre-immunization against Bovine Sadness, rational use of antiparasitic, among others.

Qualitative stage Giancola *et a*l., 2012 and 2013, present qualitative results. Limiting causes evidenced, among others, context factor such as absence of long-term agricultural policies and lack of skilled labor force. Data also showed that farmers express satisfaction "Being a cattleman" appears as a shared identity that is passed from generation to generation, pride of "being a maker and supplier of food" and livestock activity as the main source of income for farmers.

They were able to point out flaws in their knowledge in management and use of the natural field. Lack of adequate crushing appeared as a restriction for the determination of animal load. In addition, they pondered a somewhat complex subject, the allocation of the animal load of a pasture in relation to the availability of fodder and the nutritional requirements of the animals.

On sanitary issues, there was an important gap between technical recommendations given by INTAs professionals and their adoption, with clear expressions of resistance to use the sanitary calendar and prevention of venereal diseases, deworming the entire rodeo

(recommendation is up to 18-20 months of age) as well as lack of knowledge in using of HPG[3] diagnosis. In addition, very few laboratories in many areas.

Quantitative Stage Giancola *et al.* (2018), present survey results. Educational level among farmers is high, 67% initiated or currently hold university or post high school degree. Most farmers receive technical advice through the private sector (69%) or through INTA (16%). However, 49% make management decisions individually. Financing needs are clear: almost 80% of farmers said they were not able to afford adequate paddocks due to capital restrictions. In this sense, Calvo *et al.* (2016) in a comparative study in five cattle provinces, assert, "The issue of capital and the need for financing property infrastructure, suitable to livestock production horizon and its scale, arises strongly".

Farmer's demands towards INTA focus in the need for more training, general in situ research, research in pastures, small producer oriented training and the need of continuous presence of technicians in the field.

The degree of reproductive technologies adoption is adequate; most farmers park the service and implement pregnancy diagnosis. Lack of service planning is a common among smaller establishments. In general, they practice a spring and an autumn service aimed to get a more balance income throughout the year. This matches with Ondo Misi *et al.* (2015) findings in Chaco Province, which highlights that "this situation places a great challenge for INTA regarding research and extension; it is to create and transfer a set of technologies to increase the productivity and sustainability of small-scale livestock systems."

[3] HPG: estimation of the degree of parasitization in each animal (eggs per 100 grams of fecal matter).

Survey outcomes support findings in the qualitative stage regarding lack of knowledge and cultural issues, which may explain important health problems. In this sense, interpretation error regarding control of internal parasites happens in more than 55% of farms, since farmers deworm throughout the herd, far from the technical recommendation (deworming animals between 18 to 20 months old). This undoubtedly leads to unnecessary expenses.

In line with findings from the qualitative stage, most farmers show low use of HPG[3]: 25% of total farms. The main reason seems to be lack of laboratories nearby.

Findings regarding to venereal diseases, are inconsistent. 67% of farmers said they vaccine herd to prevent diseases and sampling in bulls (prepucial), but the majority perform a single swab, which indicates lack of technical knowledge. In this sense, possible communication problems are noticed, particularly in internal parasites control.

Another relevant health aspect is sadness disease. The majority of respondents are in a "dirty area", which implies immunized fields against sadness transmitted by ticks. However, probability of catching sadness transmitted by horseflies or by non-disinfected needles is high, since only 44% disinfect the needles during a routine vaccination.

Regarding the closure of the natural grassland, findings in the qualitative stage were corroborated and quantified, given that only 25% (of total farms) do so in autumn (optimal season). This technology was pointed out as critical at the time by the technicians, since there is an important potential for use and adoption path to follow in management of natural grassland.

A key practice in livestock systems is carrying capacity adjustement, 64% of farmers take into account the amount of fodder supply to decide the amount of animals to be put in pasture, but only 20% of responses were obtained when considering "nutritional

requirements of the different categories". The later also corroborates and quantifies what raised in the qualitative stage and, what is expressed in Calvo et al. op. cit., which conclude the need to generate knowledge about requirements and their relationship with fodder supply.

IV. Conclusion

Farmers are generally well informed. However, both results (focus groups and survey's respondents) show misunderstanding and lack of knowledge on health issues and infrastructure investment needs. Therefore, there is a need to strengthen knowledge in other technologies among farmers, such as carrying capacity adjustement and closure of the natural grassland. INTA should coordinate actions with veterinary schools, laboratories in each area and farmers organizations, among others; rethink and reinforce specific interventions with an interactive and collective approach and raise specific financing needs to policy makers (Giancola *et al.,* 2013 and 2018).

V. References

Calvi, M. (2017). *Análisis sobre la existencia bovina en la provincia de Corrientes*. Hoja Informativa Nº 89. Mercedes, Corrientes, Argentina. INTA Estación Experimental Agropecuaria Mercedes.

Calvi, M. (2011). *Actualización de la productividad ganadera en la provincia de Corrientes.* Hoja Informativa 43. Mercedes, Corrientes, Argentina. INTA Estación Experimental Agropecuaria Mercedes.

Calvo, S., Giancola, S., Salvador, M. L. (2016). *Pequeña y mediana producción ganadera. Configuraciones causales que afectan la dinámica de innovación en cinco provincias argentinas.* Mar del Plata, Argentina. XLVII REUNION

ANUAL AAEA Facultad de Ciencias Económicas y Sociales, Universidad Nacional de Mar del Plata.

Cap, E. J., Giancola, S. I., Malach, V. (2010). Las limitaciones de las estadísticas ganaderas en los estudios de productividad en Argentina: las encuestas a informantes calificados como fuente complementaria de datos. El caso de la Provincia de San Luis. Trabajo presentado en la XLI Reunión Anual de la Asociación de Economía Agraria, Potrero de los Funes, San Luis, 6 al 8 de octubre de 2010.

Dowbley, V. (2012). *Estudios sobre adopción de tecnología: avances en la generación de información cuantitativa a nivel de productor*. Corrientes, Argentina. Comunicación. XLIII Reunión Anual de la Asociación de Economía Agraria AAEA.

Giancola, S.; Calvo, S.; Sampedro, D.; Marastoni, A.; Ponce, V.; Di Giano, S.; Storti, M. (2012). *Corrientes. Ganadería bovina para carne. Factores que afectan la adopción de tecnología: enfoque cualitativo*. Corrientes, Argentina. XLIII Reunión Anual de la Asociación de Economía Agraria. Premio IPCVA 2012.

Giancola, S., Calvo, S., Sampedro, D., Marastoni, A., Ponce, V., Di Giano, S., Storti, M. (2013). *Causas que afectan a adopción de tecnología en la ganadería bovina para carne de la provincia de Corrientes. Enfoque cualitativo.* Buenos Aires, Argentina. Serie Estudios socioeconómicos de la adopción de tecnología N°2. Ediciones INTA. 60 p.

Giancola, S., Rabaglio, M., Sampedro, D. Dowbley, M. 2018. *Factores que afectan la adopción de tecnología en la ganadería bovina para carne de la provincia de Corrientes. Enfoque cuantitativo*. Trabajo presentado en: XLIX Reunión Anual

de la Asociación Argentina de Economía Agraria (AAEA), Facultad de Ciencias Económicas, UNL, Provincia de Santa Fe, 17-19 de octubre de 2018.

Giancola, S.I., Sampedro, D. H., Rabaglio, M.D., Dowbley, M.V., Kraemer J., Uguet Vaquer Piloni, J.P., Storti, M. G., Marastoni, A. (2018). *Factores que afectan la adopción de tecnología en la ganadería bovina para carne de la provincia de Corrientes.* Artículo de divulgación EEA INTA Mercedes.

Kitzinger, J. (1995). Introducing Focus Groups, in N. Mays and C. Pope (eds). Qualitative Research in Health Care. BMJ Publications, London.

Ondo Misi, S., Giancola, S., Pellerano, L., Calvo, S., Balbuena, O., D´Angelo, M.L., Buschiazzo, M., Di Giano, S., Gatti, N., Ferber, O. (2015). *Problemáticas de la innovación en la ganadería bovina de la provincia de Chaco: enfoque cualitativo.* Resistencia, Chaco. Serie Nº 11. Ediciones INTA - Coedición UNC.

Sampedro, D. y Calvi, M. (2016). *Situación actual y perspectivas de la ganadería vacuna de cría en Corrientes.* Mercedes, Corrientes, Argentina. Noticias y Comentarios Nº 540. Ediciones INTA

Sampedro, D. (2013). *Ajuste de la carga animal en el rodeo de cría.* Noticias y Comentarios Nº 497. Mercedes, Corrientes, Argentina. Ediciones INTA.

Servicio Nacional de Sanidad y Calidad Agroalimentaria - SENASA - Ministerio de Agricultura, Ganadería y Pesca de Argentina. Distribución de existencias bovinas por provincia. Consultado octubre 2019. https://www.argentina.gob.ar/files/2distribuciondeexistenciasbovinasporprovinciamarzo2018xlsx