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Modeling Alternative Transformation Scenarios Pathways to achieve SDG-consistent Development Goals in the Uruguayan Beef Sector

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1 INTRODUCTION

UN´s Sustainable Development Solutions Network (SDSN) project issued in 2006 the first report with the Agricultural Transformation Pathways (ATP) for Uruguay and two other selected countries. Uruguay made relevant advances in setting the desired and feasible goals and development objectives for 2030 for the beef agri-food chain. Change in production practices modeled produced a 30% increase in productivity, driven by improvements in several productive and reproductive indicators. Farms economic return also showed a positive trend while a decrease in GHG emissions per unit of beef produced.

2 MATERIALS & METHODS

Using data from the National Cattle Farm Survey 2016 (1298 farms; Bervejillo, 2018), cattle farms were classified according to their livestock business main orientation and technology level. Four productive orientation were defined: cow calf operations (CC), cow calf + backgrounding (CCB), cow calf + pasture finishing (CCF) and cattle pasture finishing only (F). Technology level was defined by a Technological Index (TI) developed based on some key management practices (use of cow condition score, pregnancy diagnosis, all year mating, pasture use, age at slaughter and stocking rate) with four levels: basic, adjusted, improved and advanced.

Within this matrix (orientation x technological level), productivity and economic income were estimated (Fernandez et al., 2019) using a simulation model (Soares de Lima, 2009).

The number of farmers to evolve towards a higher technological level in order to reach certain productive goals (in particular SDSN goals), were estimated.

3 RESULTS

The NLS confirmed the existence of a very high number of small farmers (179 ha) that carry out cow calf operations systems with very low levels of technology (CC/basic; figure 1). The second group in numerical importance are CC-F/improved farmers but unlike the previous group, they have a higher average area of 1244 ha (red arrow, figure 2), thus occupying 21.2% of the cattle area of the country; the sum of this group plus adjusted-CC-F represents one third of the total area.

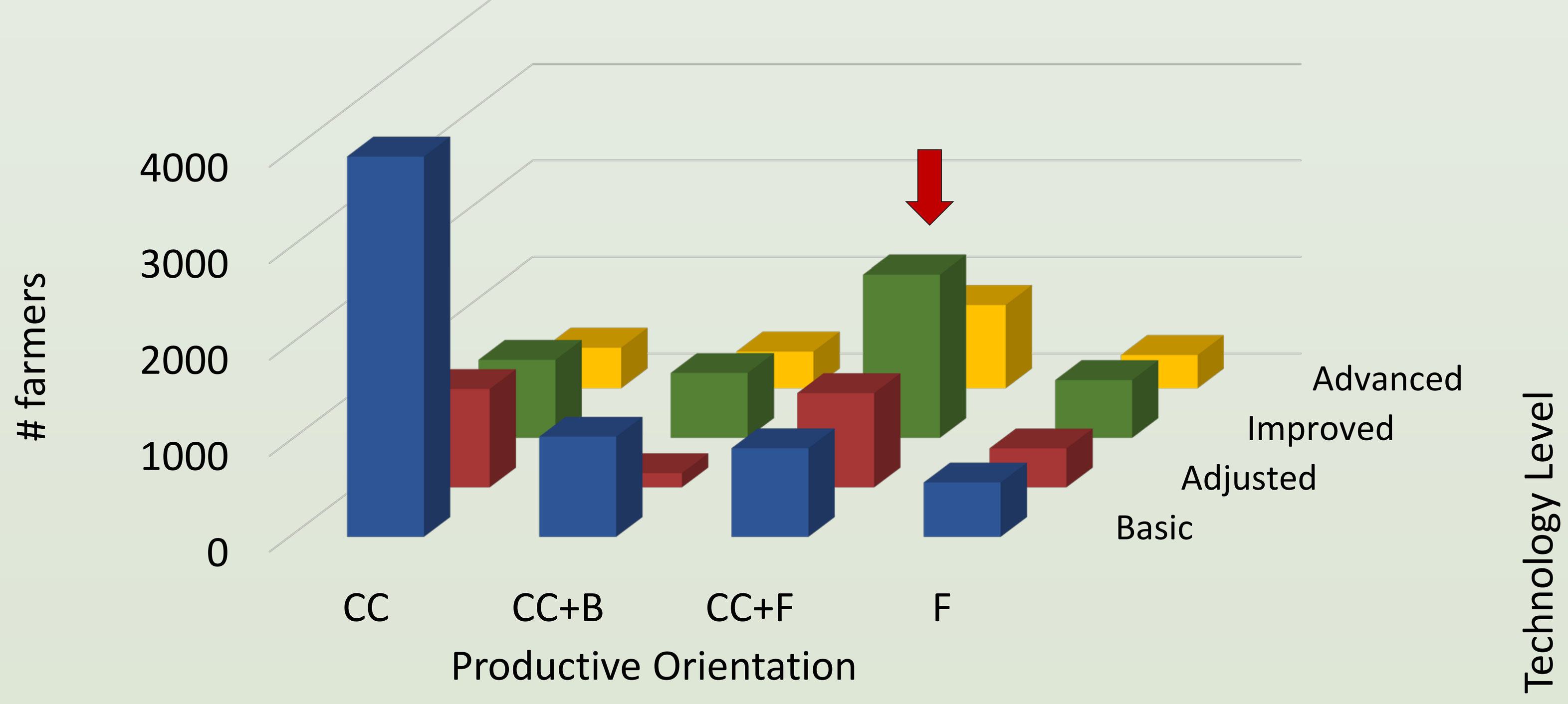

Figure 1. # farmers by productive orientation and technology level

In the case that 50% of the farmers from CC-F/adjusted and CC-F/improved can reach the next tech level (through extension mechanisms, technological transference or public policies) and the CC-F/advanced group productivity increase by 20%, the country's global livestock productivity would rise by 11.2%. While if this same process were given in the same way but in the CC systems, the increase in productivity would be only 2.6%.

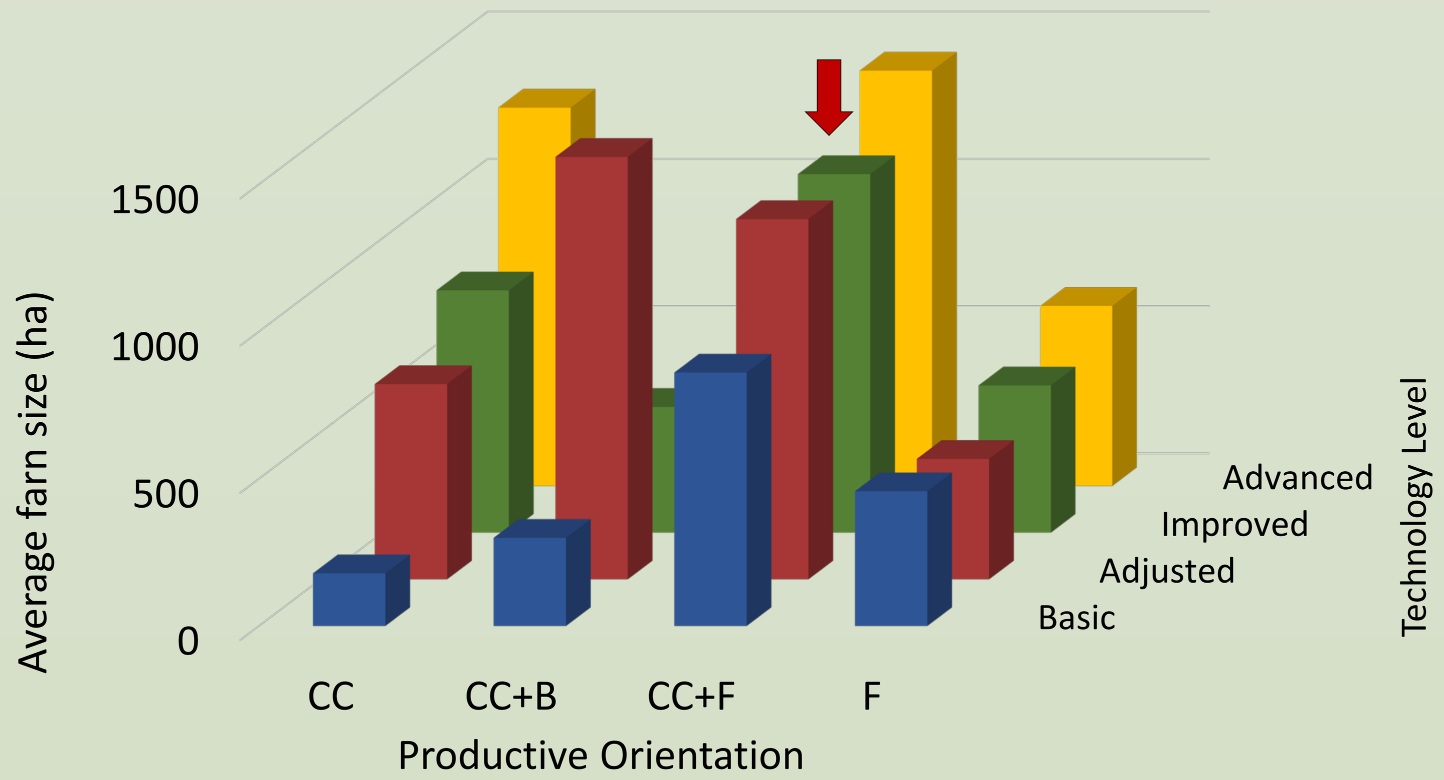

Figure 2. Average farm size by productive orientation and technology level

If we aspire to achieve goal set by the SDSN, ie a 30% increase in the global livestock productivity of the country, the evolution of the farmer's technological level should be given as shown in table 1. At the basic level, which it is assumed that it is a stratum of farmers with very low levels of adoption of technology, an evolution of 30% of farmers towards the adjusted level is proposed, while in the other levels, there is an evolution of 90% of the producers to the next tech level. In addition, an increase of 23% in the productivity of the advanced group is proposed.

The results of that scenario are presented in table 2.

Table 1. % of farmers evolving to the next level to reach SDSN goals

	CC	CCB + CCF	F
Basic to adjusted	30	30	30
Adjusted to improved	90	90	90
improved to advanced	90	90	90
Productivity increase in advanced (%)	23	23	23

Liveweight production multiplied by the number of farmers in each stratum according to the NCS, satisfactorily adjusted to the current beef production level in Uruguay as seen on BASE scenario in table 2.

Applying the changes defined in table 1, a NEW scenario is reached, where the global beef production reaches 125 kg LV weight/ha and the net income is set 9,3% higher.

Table 2. BASE and NEW scenario according with SDSN goals

	BASE	NEW	VARIATION (%)
Productivity (kg LW/ha)	**96**	**125**	**30%**
Improved pastures area (%)	7,9%	11,4%	44,9%
Slaughter (thousand tt)	1066	1338	25,5%
Gross Income (mill USD)	2403	2802	16,6%
Direct costs (mill USD)	374	428	14,5%
Pasture costs (mill USD)	125	193	54,0%
Animal feed cost (mill USD)	103	196	90,1%
Total Costs (mill USD)	1053	1267	20,3%
Gross Margin (mill USD)	1403	1490	6,2%
Fixed Costs (mill USD)	451	450	-0,2%
Net Margin (mill USD)	951	1040	9,3%

All this economic variations are estimated only through the direct change, did not consider indirect benefits on the economy based on new goods and services generation due to the increase on beef production.

4 FINAL REMARKS

- Combining real data from surveys with bioeconomic simulation techniques, allowed us to successfully reproduce the current beef production chain at a country level
- This study is an important base of analysis for public policies development and the study of its potential impact
- It would allow to determine the constraints for productive growth, establish the necessary resources for its promotion and analyze the returns of the private and public investment involved

5 REFERENCES

- Bervejillo, J. et al. 2018. Resultados de la Encuesta Ganadera Nacional 2016, Anuario Opypa, MGAP, pág 443,
- Fernández, E., Soares de Lima, J.M., Ferraro, B., Lanfranco, B. (2019) "Technology adopction, production performance, and factors driving farmer's decision-making process in beef cattle farms in Uruguay" 23rd ICABRConference. Poster # 225, Ravello, Italy | June 4-7
- Soares de Lima, J.M. (2009). Modelo bioeconómico para la evaluación de impacto de la genética y otras variables sobre la cadena cárnica vacuna en Uruguay. PhD Thesis. Departamento de Estadística e Investigación Operativa Aplicadas y Calidad. Universidad Politécnica de Valencia. Valencia, España: 240 pp.

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