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

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Some conceptual and methodological considerations

There are **technologies** available that are not implemented.

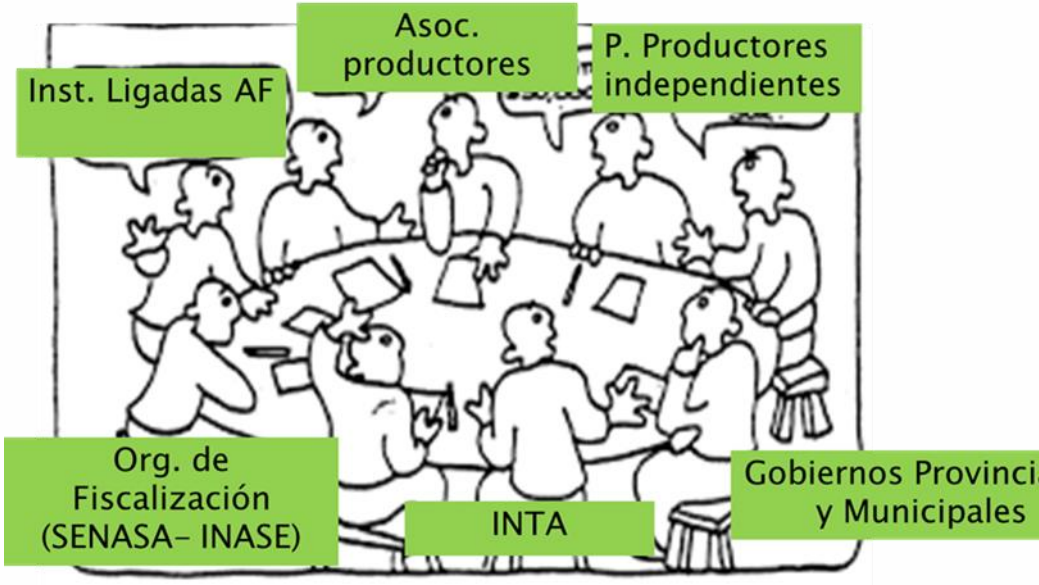
Difficulties in the **innovation** process.

Techonology

- hard/soft or
- input (genetics, agrochemicals)/process (organizational)

Some conceptual and methodological considerations

Innovation is defined according to users and acquires that character if it is perceived as novel by them.



Innovation is:

- interactive
- turbulent
- reciprocal adaptations
- constant experimentation
- negotiation between various actors

Some conceptual and methodological considerations

Social reality requires the convergence of observations from multiple sources of Knowledge.

We need understand adoption reasons…

- different disciplines and methodologies
- in a collective, participatory, interactive, actor-oriented, territorial way

Especific intervention strategies

Agricultural activities in family production systems with varying degrees of capitalization (K)

Beef cattle in Corrientes province, Argentina

The province of Corrientes covers an area of 88,200 km^2.

Livestock represents 64% of the provincial área.

Beef cattle in Corrientes is estimated in 4.5 million heads.

As total Argentinian stock is 54.8 million heads, Corrientes takes the fourth place with 8.5% share and contributes with 10.4% of the country's cows.

A productive orientation index (IOP*) for Corrientes province of 0.3; which shows that the main activity is breeding - wintering.

* Index of productive orientation (steers + young bulls) / cows

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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.

- ✓ The average weaning index is 64%.
- ✓ The average provincial production is 50 kg of live weight per hectare and year.

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.

Since 2010 researchers at INTA have been studying the phenomena in different productions and regions of the country.

In the beef cattle case in Corrientes, the following objectives were raised:

Main objective

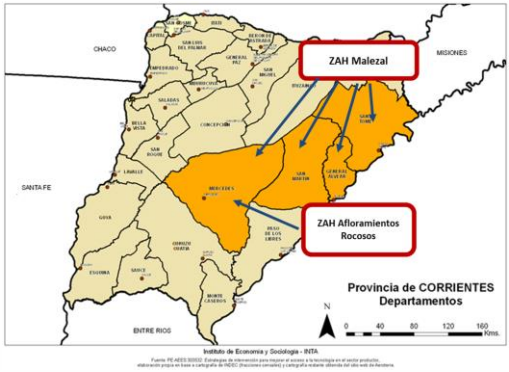
Identify the determining factors in technology adoption for bovine livestock production for meat corresponding to the 500-3000 head stratum (per livestock establishment) in the province of Corrientes.

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.

Methodology

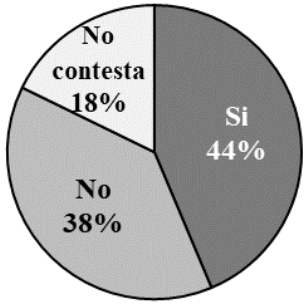
- ✓Definition of the population and study área



- ✓Technological Profile and identification of critical technologies

- ✓Qualitative stage

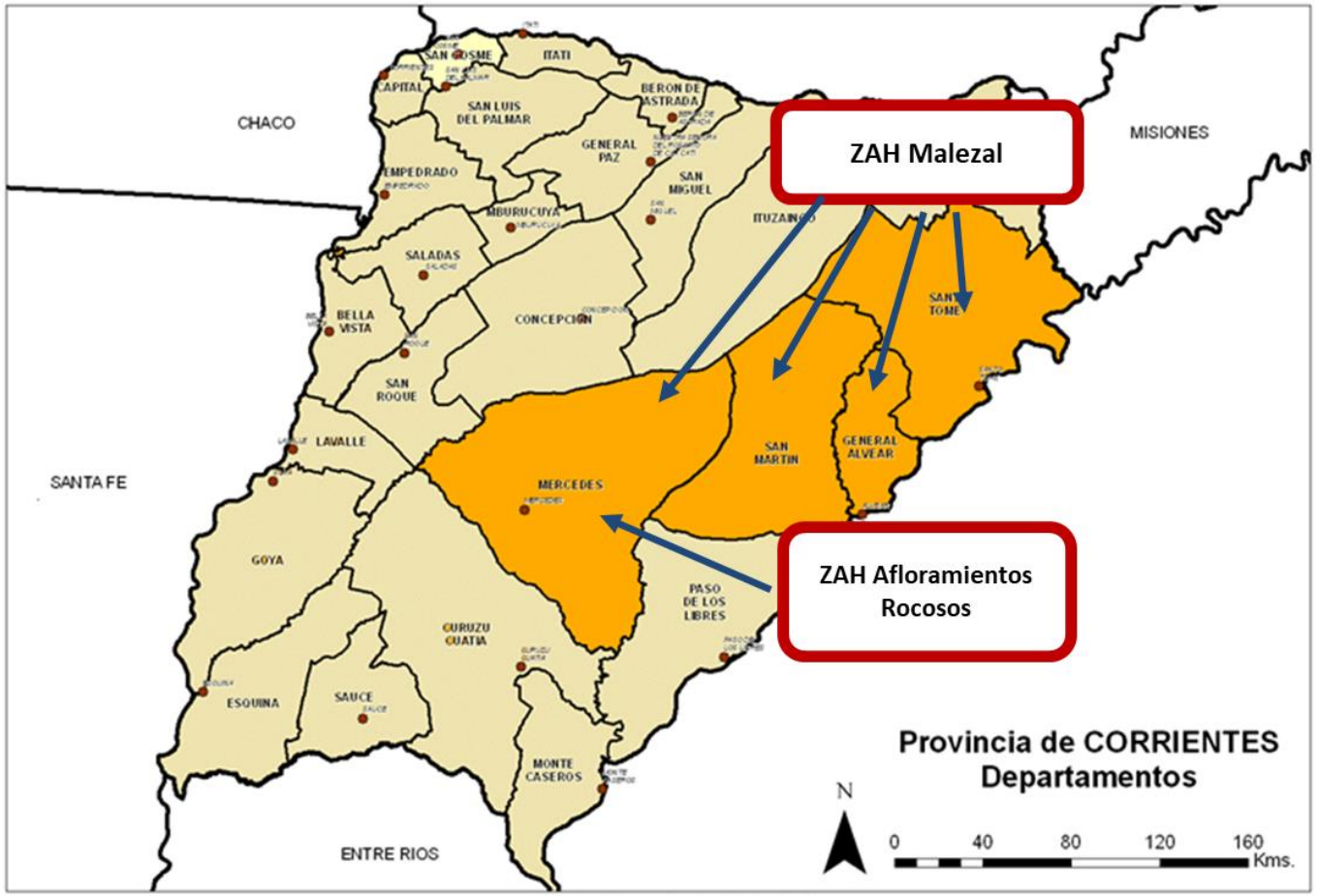
- ✓Quantitative stage



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.

Study area



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Fuente: PE AEES 303532: Estrategias de intervención para mejorar el acceso a la tecnología en el sector productor, elaboración propia en base a cartografía de INDEC (fracciones censales) y cartografía restante obtenida del sitio web de Aeroterra.

Technological Profile and Identification of critical technologies

Methodology of technological profile, developed by INTA, relies on participatory workshops with livestock sector professionals.

Reach consensus

Technological Profile

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).

Productivity gaps

Productivity gaps: percentage variance between productivity of the low technological level and the high technological level, not explained by agro ecological issues.

Critical technologies

Critical technologies are identified, defined as those that, when adopted, generate significant impact on productivity, quality, social and environmental aspects

Productivity gaps

Provincia	Zona Agroecológica	Productividad (kg/ha/año)		Brecha de productividad
		NT Bajo	NT Alto	
Buenos Aires	Cuenca del Salado	67	115	72%
Corrientes	Afloramientos Rocosos	40	90	125%
Corrientes	Lomadas Arenosas	40	80	100%
Corrientes	Malezal	25	50	100%
Formosa	Departamentos Ramón Lista, Matacos, Bermejo - Formosa	10	50	400%
Formosa	Departamento Patiño	15	60	300%
Formosa	Departamentos Formosa, Pilcomayo, Pirané y Laishí	15	50	233%
San Luis	Departamento Chacabuco	15	40	167%
Chaco	Departamento Bermejo	22	70	218%

Critical technologies

18 critical technologies were selected:

- ✓ Adequate number of plots
- ✓ Set aside natural pasture (pasto diferido)
- ✓ Carrying capacity adjustement
- ✓ Service in three months
- ✓ Old for the service (cow)
- ✓ Prevention of venereal diseases
- ✓ Rational use of antiparasitic,

among others

Qualitative stage

Qualitative method in technology adoption studies in agricultural sector

- ✓ Understand the phenomenon of technology adoption, capturing the subjective dimension from the perspective of the producer located in the context.
- ✓ Understand how and why.
- ✓ Establish differences or coincidences between
- ✓ the vision of producers and technicians.
- ✓ Analyze and contribute as a product per se.
- ✓ Input to address in quantitative stage (triangulation).

Qualitative stage - Focus groups

Anouncement: without giving much information; “to listen”.

Group of producers (6-10). 2 hours of work.

Semi structured inquiry (guide). From the general context to the particular critical techonologies.

Moderador trained in inquiry techniques.

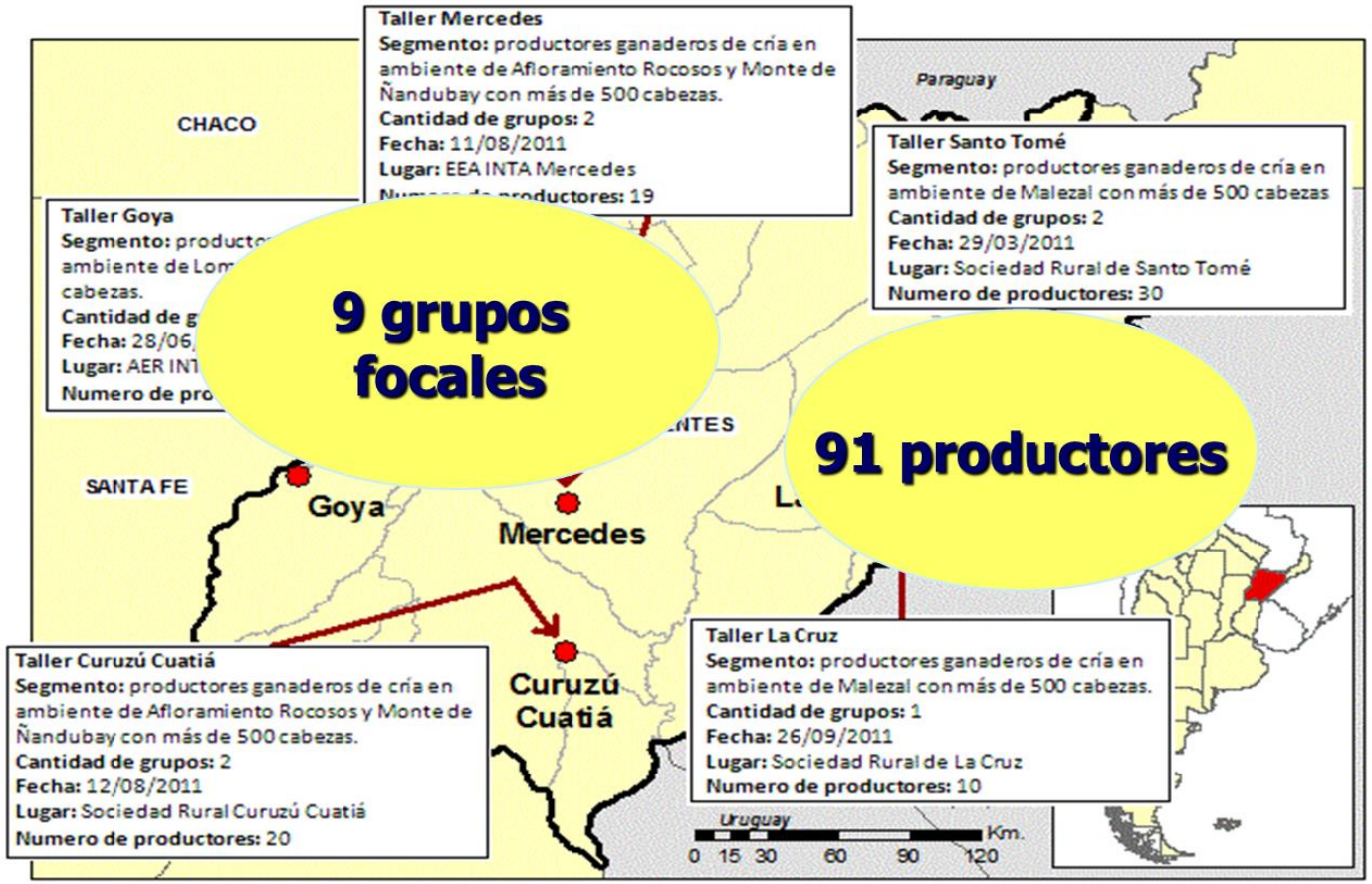
It is important homogeneity of participants.

It is important to capture heterogeneous thoughts. No consensus.

Interaction between participants.

Adequate logistics.

Qualitative stage - Focus groups



Fuente: elaboración Rabaglio M., Instituto de Economía y Sociología - INTA. En base a datos del PEAEES 303532 "Estrategias de intervención para mejorar el acceso a la tecnología en el sector productor" y cartografía del Atlas de Suelos de la Rep. Argentina publicado por ArgenINTA, INTA y Aeroterra S.A..

Results qualitative analysis

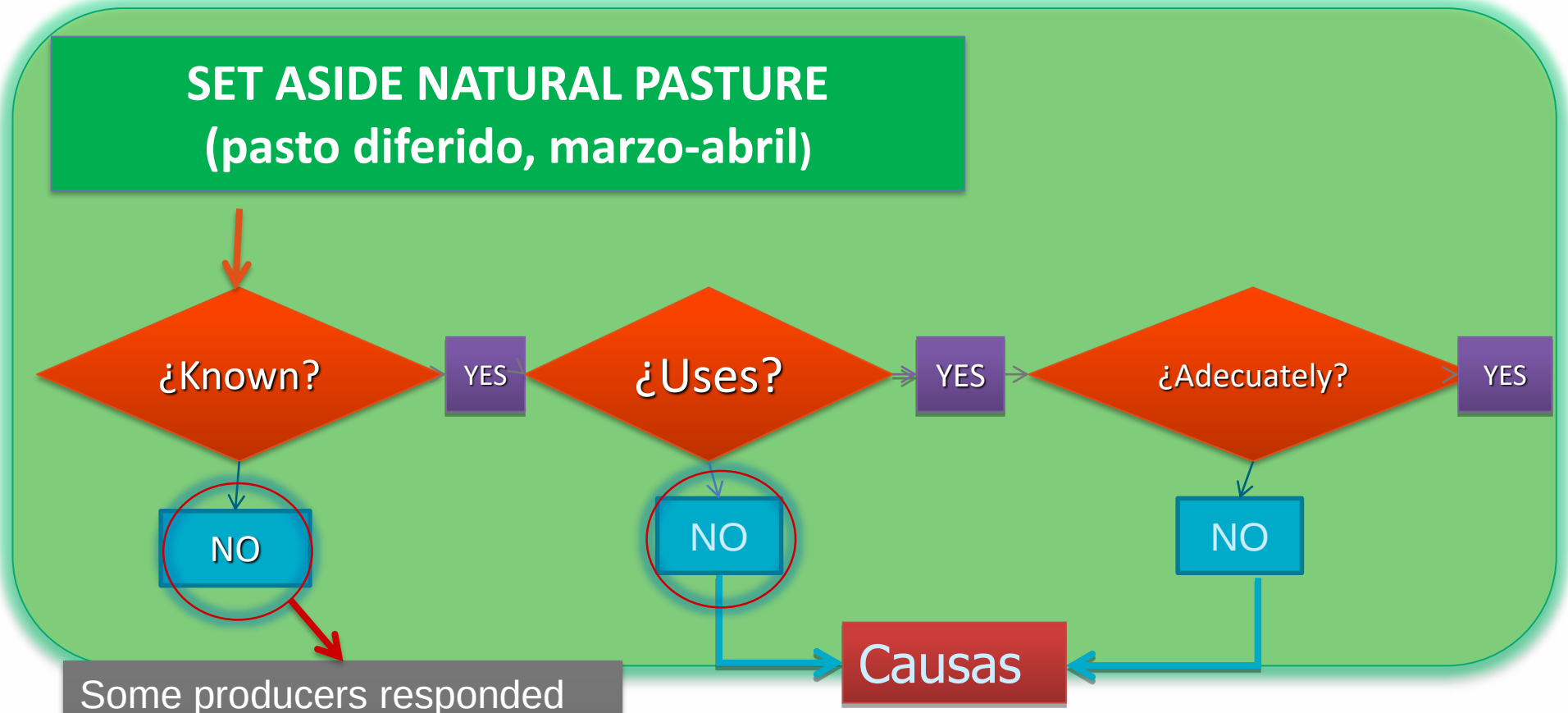
- Livestock activity as the main source of income for farmers
- Limiting causes evidenced, among others, context factor such as absence of long-term agricultural policies, lack of skilled labor force
- Farmers express satisfaction "Being a cattleman" appears as a shared identity that is passed from generation to generation
- Lack of adequate number of plots as a restriction for the determination of carrying capacity adjustement.
- Carrying capacity adjustement. 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.

Results qualitative analysis

- On sanitary issues, there was an important gap between technical recommendations given by INTAs professionals and their adoption.
- 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).
- Lack of knowledge in using of HPG* diagnosis. In addition, very few laboratories in many areas.

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

Results qualitative analysis



Some producers responded by referring to other practices, such as "burning" (August) or cutting

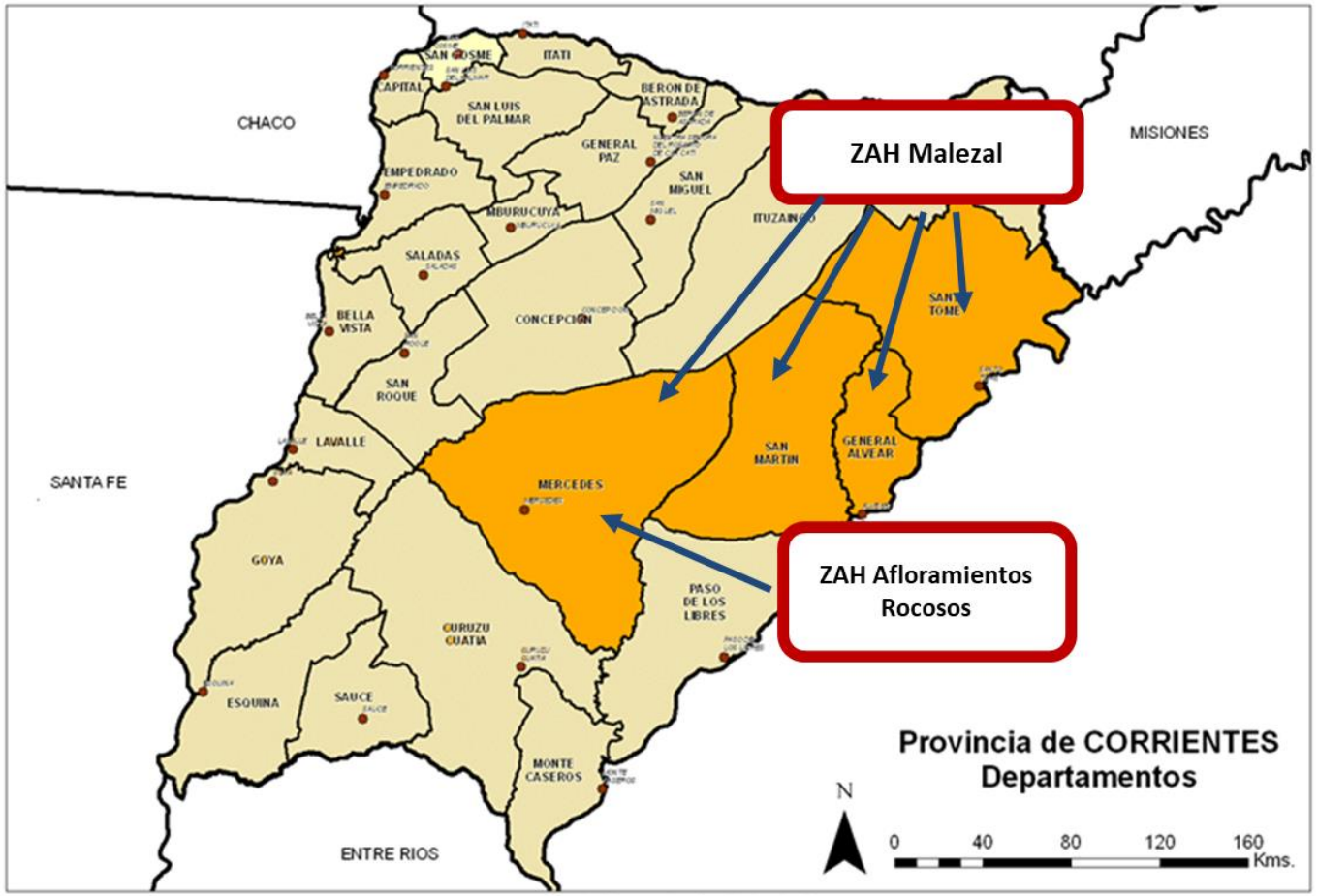
Due to lack of division of the field (plots)

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.

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.

Study area



Instituto de Economía y Sociología - INTA

Fuente: PE AEES 303532: Estrategias de intervención para mejorar el acceso a la tecnología en el sector productor, elaboración propia en base a cartografía de INDEC (fracciones censales) y cartografía restante obtenida del sitio web de Aeroterra.

Survey

- 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.

- Statistical unit. Livestock farmers who have between 500 and 3000 heads and are mainly dedicated to raising cattle (IOP <0.40).

- Sample frame: SENASA´s registry (National Agrifood Health and Quality Service Argentina).

- Fieldwork: september 2012 – may 2013.

Sample size

Departamento	ZAH	Población objetivo	Encuestas
Santo Tomé	Malezal	67	27
Mercedes	Malezal	44	14
Gral. Alvear	Malezal	15	11
Gral. San Martín	Malezal	37	26
Mercedes	Afloramientos Rocosos	63	26
		226	104

For the sample design, the systematic method of Madow was applied with proportional probability to size.

Socio-productiva characterization

The average of the total area of the farms is 1,850 hectares, with 94% of the area dedicated to livestock (average of 1,740 hectares).

Superficie Ganadera (ha)	Cantidad de EAPs	% del total de EAPs	% acumulado total EAPs
0-500	9	3,8	3,8
501-1000	69	30,4	34,3
1001-2000	82	36,2	70,4
2001 en adelante	67	29,6	100,0
	226	100,0	

Total livestock stock on average is 1,258 cattle.

Socio-productiva characterization

- 95% of the producers are men.
- 7/10 do not reside in the farm.
- 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.

Results: Critical technologies

- Set aside natural pasture (pasto diferido)
- Carrying capacity adjustement
- Racional use of antiparasitesis
- Prevention of venereal diseases: vaccine and sampling in bulls (prepucial)

Set aside (pasto diferido)

Regarding the set aside in natural pasture (pasto diferido), findings in the qualitative stage were corroborated and quantified, given that only 25% (of total farms) do so in optimal season (March-April).

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 field.

Carrying capacity adjustement

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.

Racional use antiparasitesis

It is of fundamental importance the control of internal parasites in the stage of rearing of young bulls and heifers from weaning (6 to 7 months) until 18 months of age.

The HPG is an estimate of the degree of parasites of the animal (eggs per 100 grams of fecal matter). It is recommended to perform it in animals up to 18-20 months of age, taking a sample of 10% of these categories. It is used to know if the antiparasitic should be practiced or not, or if the antiparasitic had its effect by eliminating the internal parasite.

The rotation of drugs is the alternate use of pharmacological products to avoid resistance of parasites.

Racional use of internal antiparasitesis

100% apply antiparasitic

55% applies to all categories - NOT NECESSARY!

36% Do not rotate drugs. Why?

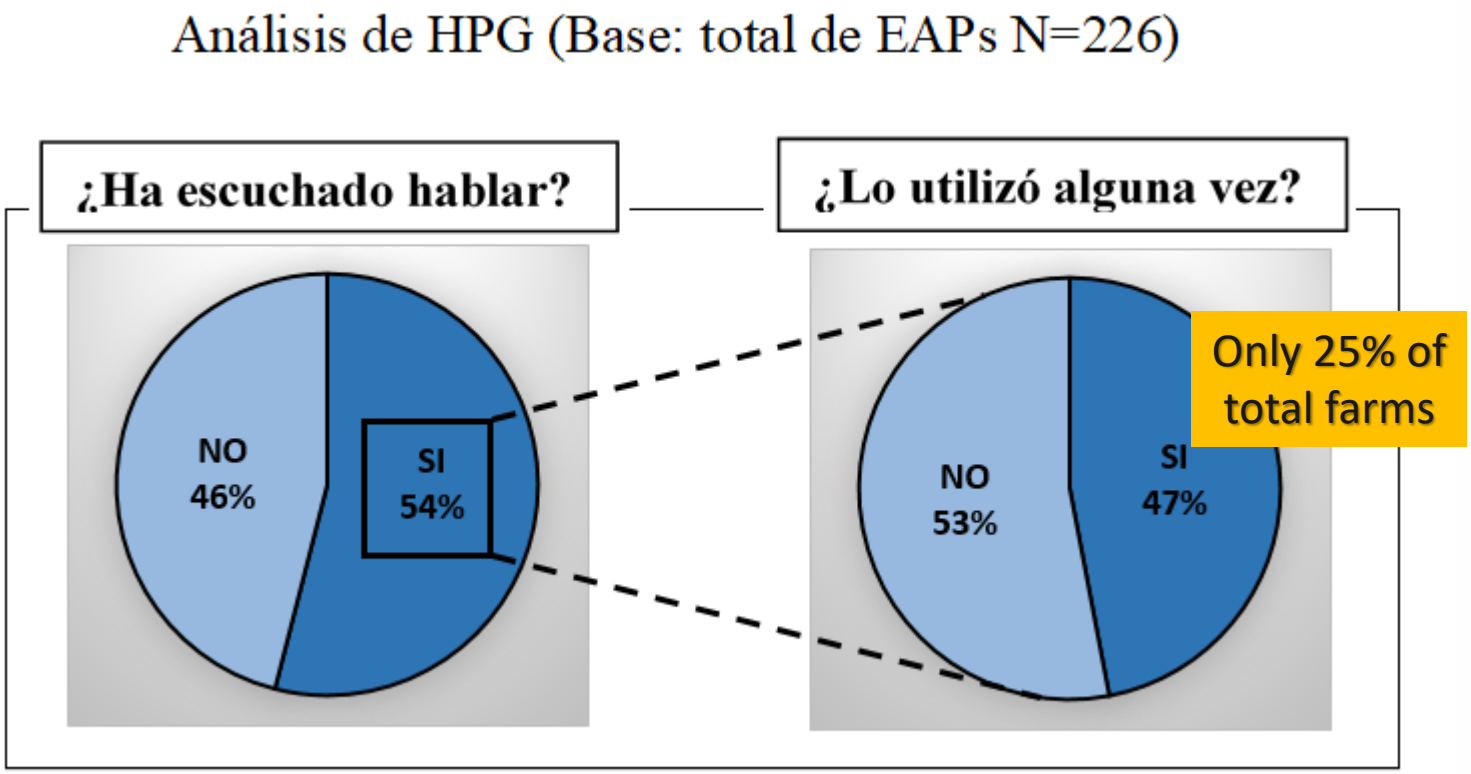
¿Por qué no cambió la droga? (Base: N=82)

	Cantidad de EAPs	% de EAPs
No es necesario	41	52,6%
No sabe	31	40,9%
Por Costo	5	6,4%
Total	77	100,0%

Nota: cabe aclarar que contestaron la pregunta 77 EAPs de las 82 consultadas

Prevention of venereal diseases

In line with findings from the qualitative stage, most farmers show low use of HPG:



Prevention of venereal diseases

* 33% who responded DOES NOT perform HPG. Why?

¿Por qué no utilizó el análisis de HPG? (Base: N=65)

	Cantidad de respuestas	% de EAPs
No hay laboratorio en mi zona	21	32,2%
Comodidad/costumbre/no es necesario	13	20,1%
Es problemático sacar las muestras	9	13,6%
No sabe / No especifica motivos	7	10,8%
Por costo	5	7,1%
Falta apoyo veterinario	4	6,2%
Otros	6	9,2%
Total	65	100,0%

Nota: pregunta respuesta múltiple.

The main reasons: lack of laboratories nearby and It is not necessary

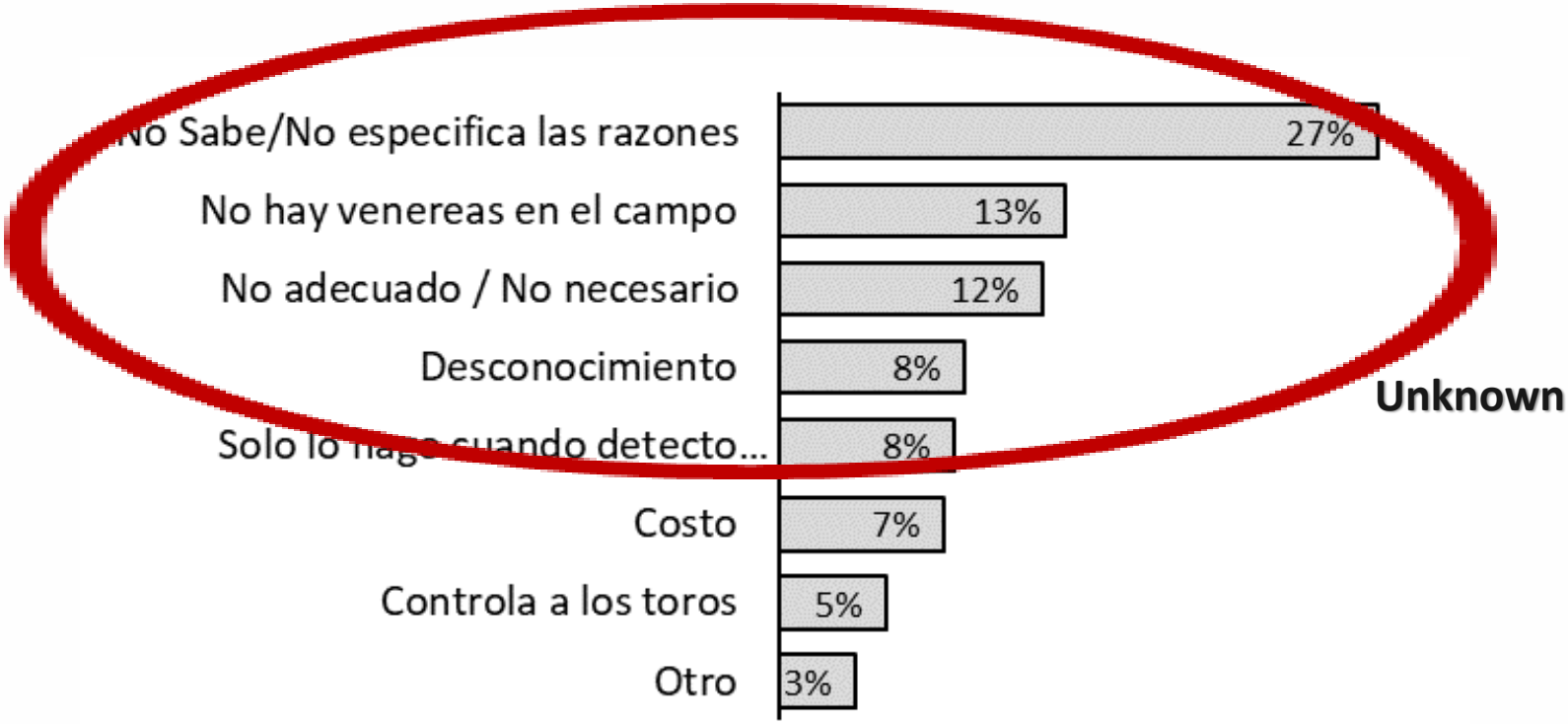
Prevention of venereal diseases

Venereal diseases are those that are spread by sexual transmission and affect reproduction.

67% of farmers said they vaccine herd to prevent diseases and sampling in bulls (prepucial), **but the majority perform a single sample, which indicates lack of technical knowledge.**

Prevention of venereal diseases

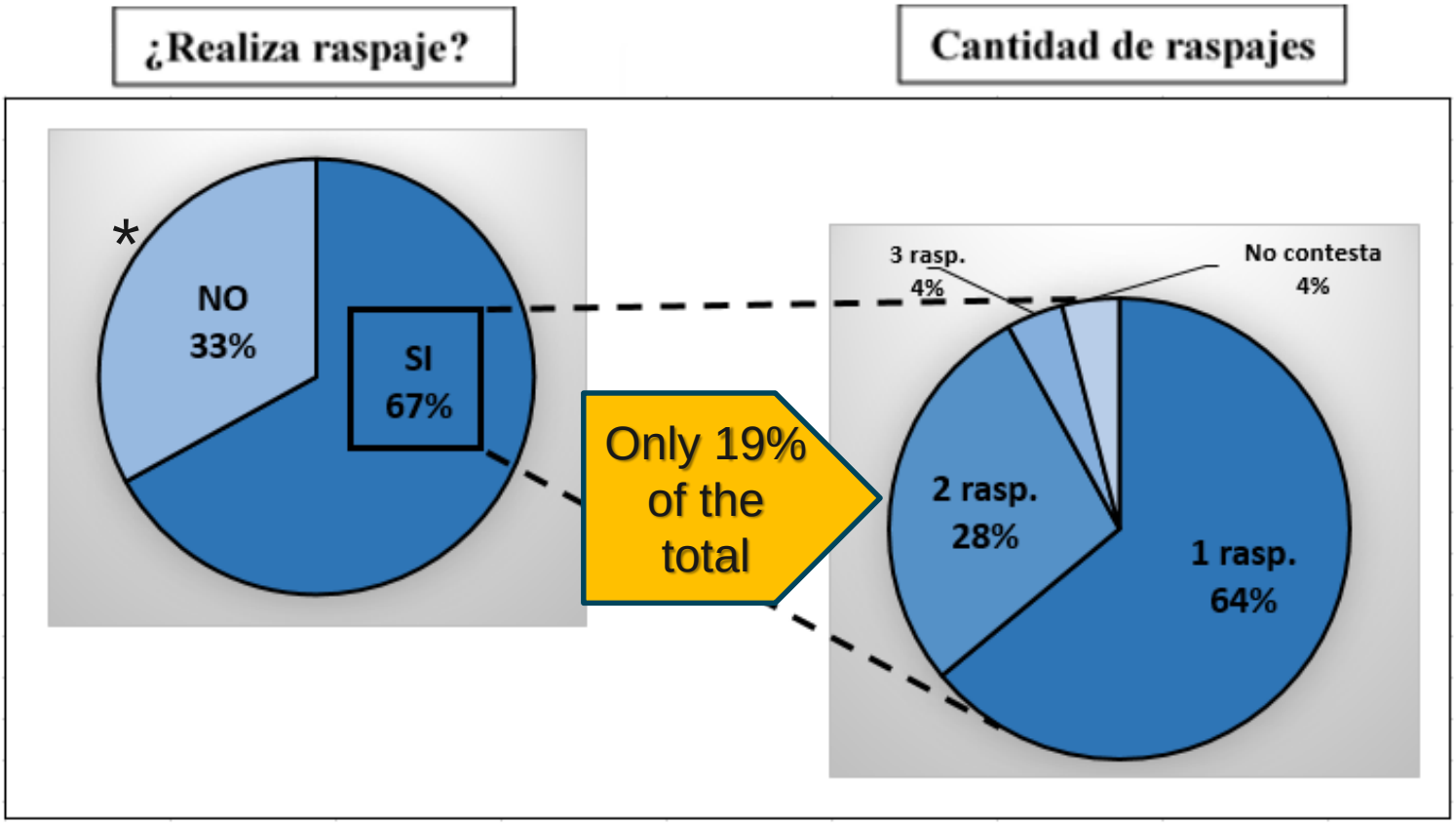
33% asked: Why don't you usually vaccinate against venereal diseases?



Nota: pregunta respuesta múltiple.

Prevention of venereal diseases

Sampling in bulls (prepucial). How many?



At 33% who does not sample. Why?

¿Por qué no hace raspaje? (Base: N=74)

	Cantidad de respuestas	% de EAPs
Es costoso	13	17,3%
No sabe / No contesta	12	16,2%
No lo considera necesario	10	12,9%
Falta de tiempo	9	12,0%
Por desconocimiento	8	11,1%
No hay venéreas en mi campo	6	8,2%
Por comodidad	3	4,1%
Otros	4	5,9%
Total	65	87,8%

Nota: pregunta respuesta múltiple.

Unknown

Some conclusions

Farmers are generally well informed. However, both results (focus groups and survey's respondents) show misunderstanding and lack of knowledge on health issues.

Therefore, there is a need to strengthen knowledge in other technologies among farmers, such as carrying capacity adjustement and set aside in natural pasture (pasto diferido).

INTA with other public and private institutions, such as, SENASA, veterinary schools, laboratories in each area and farmers organizations should coordinate actions; rethink and reinforce specific interventions with an interactive and collective approach, clear communication messages in health matters and raise specific financing needs to policy makers.

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Special thanks to the producers who participated in the focus group and the survey.

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¡Thank you!