Relationship between technological innovation and the variability of dairy sheep production in the Mancha, Spain

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Introduction (Sheep production)

The sheep farms are family based, that make use of local resources and promote the endogenous development, the preservation of the bio-diversity and the maintaining of employment in rural areas

Introduction

The identification of technologies and its grouping into packages acquires strategic relevance in the competitive positioning of the firm; de Pablos-Heredero et al., (2012)

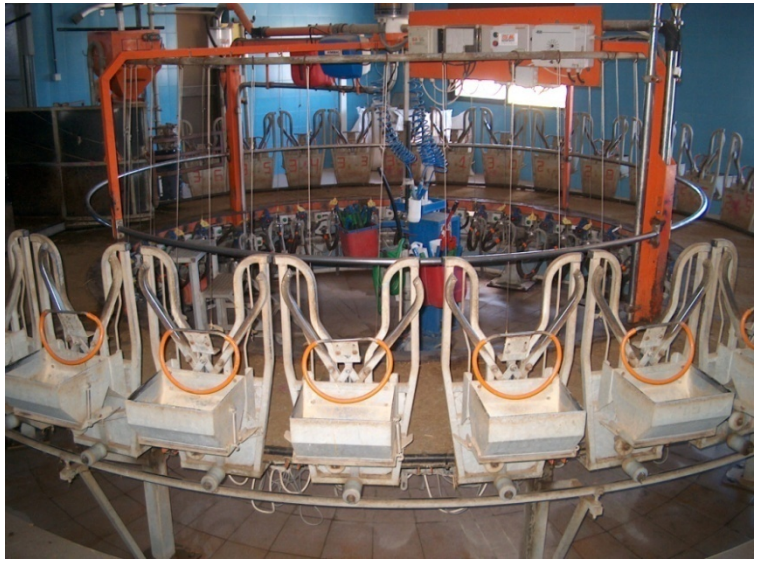
Objetive

- How can they improve? ..How can technologies be implemented?
- Tools

-Reproductive strategies
- Feeding
-Management and production system
- Organizational aspects
- Millk quality and hygiene

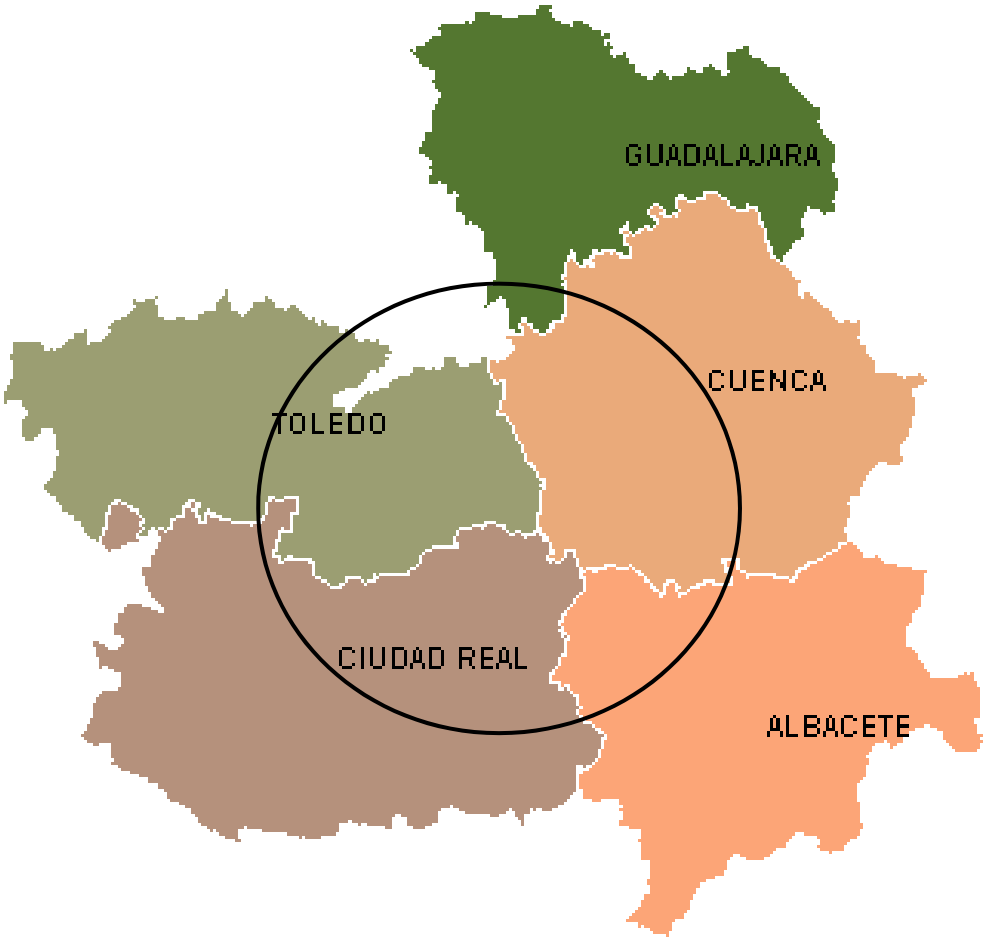
Objetive

the aim is to identify technological packages in mixed dairy systems and its practical implications in the variation of the results. ...



Material and methods (Data collected)

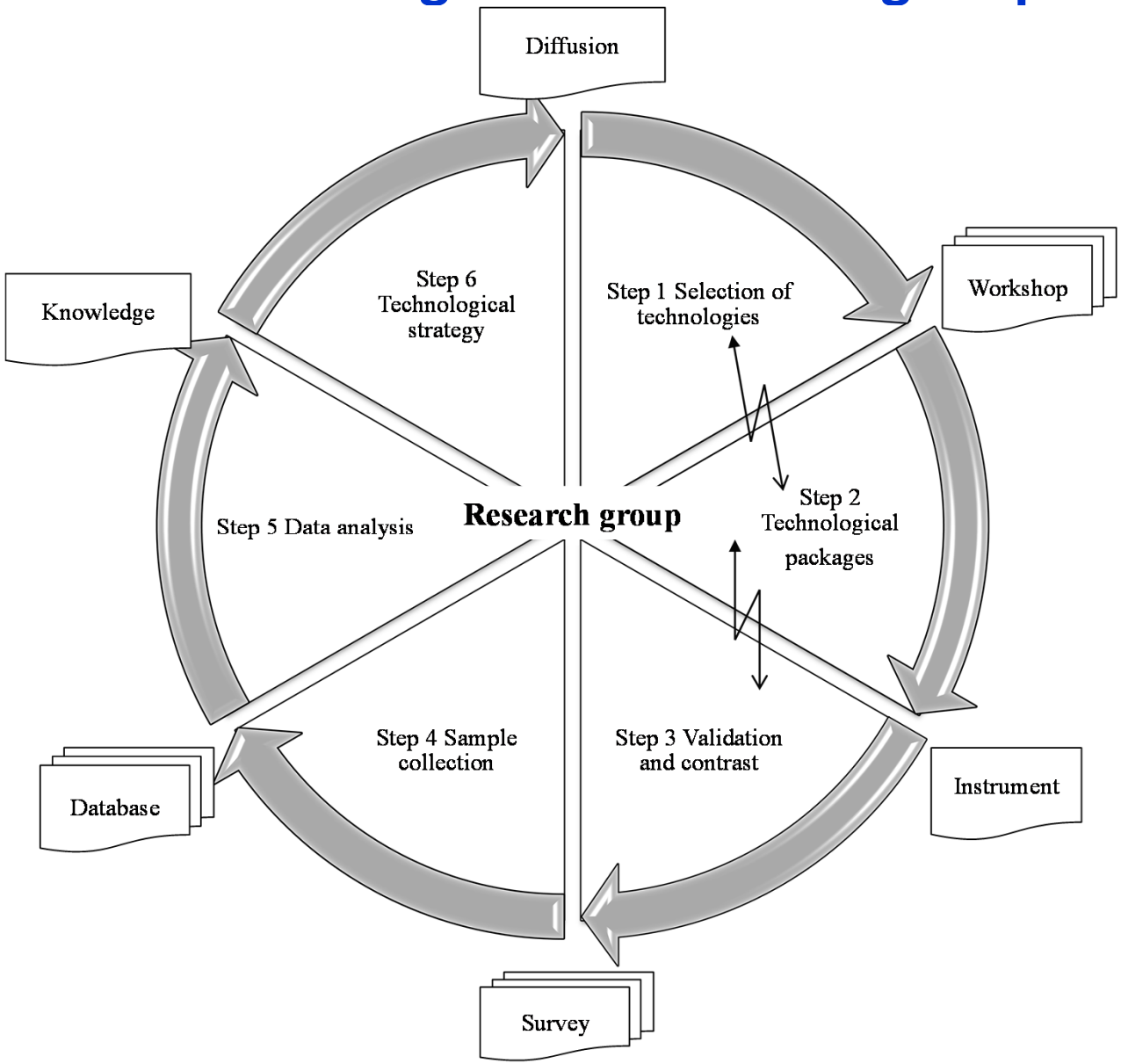
- ✓Castilla-La Mancha
- ✓907 farms y 800.000 ha. Mixed system.
- ✓Survey 236 items
- ✓157 farms
- ✓Period 2011 - 2013



Selection of technologies and technological packages

- ✓ 77 Technological Variables
- ✓ 14 Experts
- ✓ 38 technologies
- ✓ 6 technological packages

Selection of technologies and technological packages



Technological packages

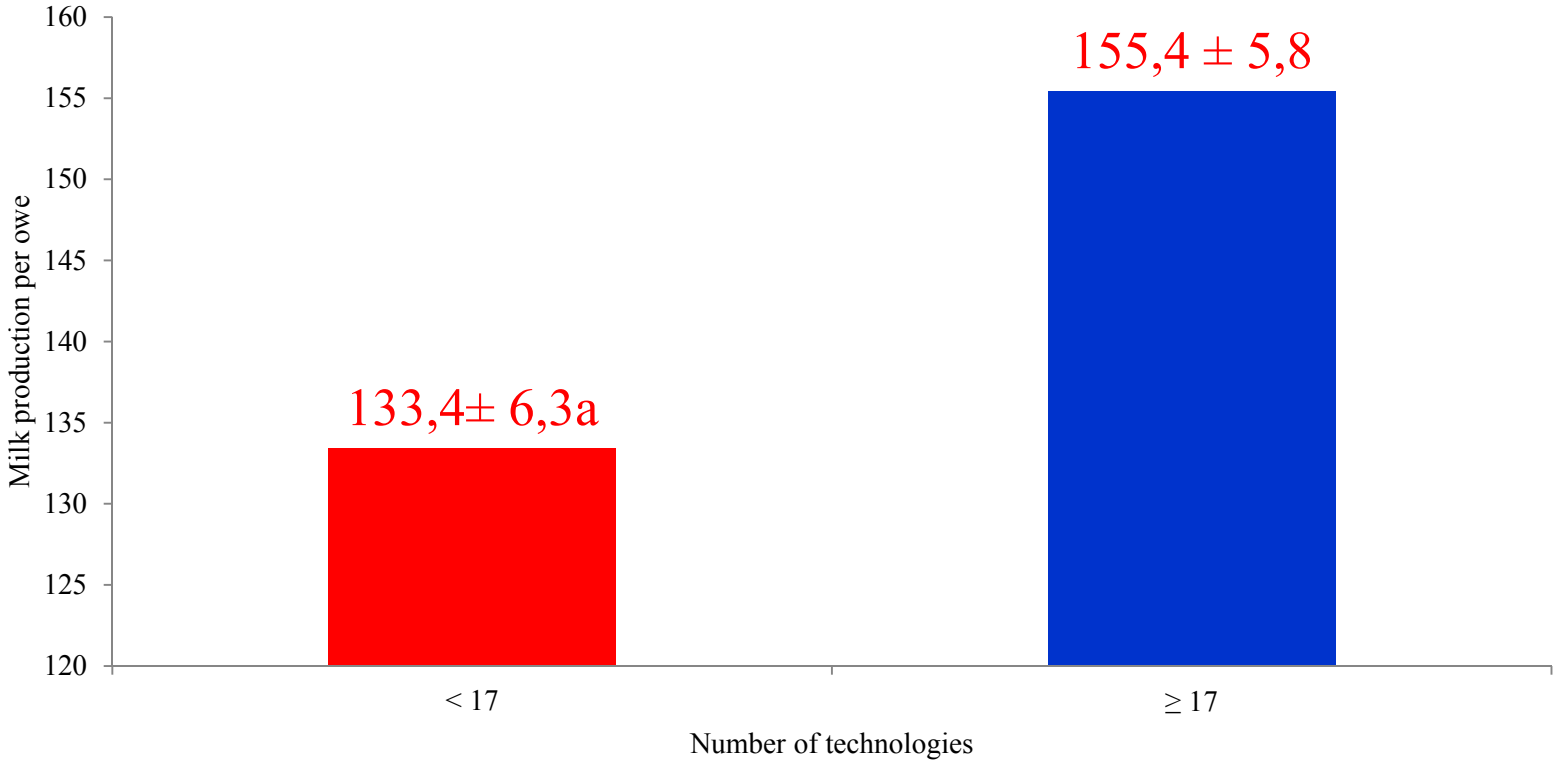
PT1. Management. Technologies oriented to data entry and its transformation into information, ideas and knowledge that allows generating strategies for the improvement of production
PT2. Feeding. Technologies that allow the identification and optimization of the animal feeding system (minimal cost – maximum production)
PT3. Biosecurity. Technologies that allow reducing the risk associated with animal health, and the improvement the quality of the milk
PT4. Land use. Technologies that identify strategies that improved the use of the natural pastures, the rests of the crops and and processing of food (ensilage or hay)
PT5. Equipments. Technologies that allow the optimization of the infrastructures and human resources without compromising the animal and environmental welfare
PT6. Reproduction. Technologies that allow optimizing the production and promote the genetic improvement of the flock
i.e. reproduction Variables: 1) The putting into practice of reproductive techniques (male effect, flushing, hormonal treatments, etc.). 2) El use of ultrasound scans is a routine and it is oriented to identify non productive animals (empty). 3) Androgen evaluations are realized to warranty the fertility rates and the optimization of copulations. 4) The rams that take part in the reproduction follow a genetic evaluation. 5) The use of artificial insemination is used as a tool to promote the genetic improvement. 6) The copulation is guided, a male is assigned to a female by applying technical criteria. 7) The planning of the reproductive process is aligned with the dynamic of the operational processes at the farm

Results

- **Table 1. Level of adoption of the technological packages (43%)**

Technological packages	Technologies	
	Evaluated (n)	Adopted (%)
TP1. Management	7	55.7
TP2. Feeding	5	56.0
TP3. Biosecurity	8	**67.8**
TP4. Land use	5	**32.0**
TP5.Equipment	6	**41.6**
TP6. Reproduction	7	**35.7**

- **Table 2. Effect of innovations in milk production**



- **Table 3 . Correlation coefficients amongst technological packages and productive variables**

TP	TP1	TP2	TP3	TP4	TP5	TP6	MP	LP	EI
TP1. Management	1	-0,17*	0,51**	0,29**	**0,63****	**0,61****	0,52**	0,52**	-0,36**
TP2. Feeding		1	-0,02	-0.12	-0.08	-0.07	0,22**	0,22**	-0,11
TP3. Biosecurity			1	0,29**	0,34**	0,35**	0,46**	0,42**	-0,28**
TP4. Land use				1	0,34**	0,34**	0,34**	0,37**	**-0,69****
TP5. Equipment					1	**0,89****	0,52**	0,52**	-0,41**
TP6. Reproduction						1	0,43**	0,44**	-0,35**
Milk production (MP)							1	0,87**	-0,36**
Lambs production (LP)								1	-0,37**
Feeding costs (EI)									1

- **Table 4. Effect of technological packages adoption**

	Milk production		Lambs (n)		Feed cost (%)	
	β	*P*	β	*P*	β	*P*
Constant	-35,509.5	0.036	-396.8	0.028	116.1	0.000
TP1. Management	0.187	0.024	0.176	0.030	-	
TP2. Feeding	-		-		-0.252	0.000
TP3. Biosecurity	-		-		-	
TP4. Land use	-		-		-0.729	0.000
TP5. Equipment	-		-		-	
TP6. Reproduction	0.458	0.000	0.494	0.000	-	
R^2	**0.350**		**0.382**		**0.623**	
P	0.000		0.000		0.000	

Conclusions and recomendations

The identification of technological packages and its degree of implementation facilitates the transformation of processes and the improvement of the competitive dryland mixed system cereal-sheep. The higher levels of technology adoption are materialized in the Animal health, feeding and management packages and its implementation respond to **a coordinated process.**

The technological packages show synergies amongst them, and the adoption of a new technology requires the modification in some key processes. Besides the technological options are developed therefore in the **dynamic context** of the firm that is involved **in multiple interactions.**

TP	Improvement	Challenge
TP1. Management	Animal identification Records Operating planning secluded	Incorporating animal identification and decision making records. More participation in milk recording Breeding program Comprehensive operating plan
TP2. Feeding	Mineral block Unifeed Supplementation	Optimize feed and feeding Use of by products in animal diets
TP3. Animal health-quality milk	Basic health plan Use post milking teat dip	Adapt the health plan to the farm Enhancing plan of quality of milk
TP4. Pasture-land use	Guided grazing Mixed system	Improvement of the grazing strategy Forage reserves
TP5. Equipments-facilities	Milking parlour System for milk refrigeration Maternity and feeding rooms	Hygiene rooms Optimize the use of the implemented technology
TP6. Reproduction-genetic improvement	Reproductive techniques Heat synchronization, A.I., flushing, male effect, induced mating Improving ram	**Reduction of the lambing interval** **Early diagnosis of pregnancy** **Androgenic male evaluation** **Detection of non productive ewes**