



GOBIERNO
DE ESPAÑA

MINISTERIO
DE ECONOMÍA, INDUSTRIA
Y COMPETITIVIDAD



How to define an measure sustainability?

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Efficiency and resilience of forage resources and small ruminant production to cope with global challenges in Mediterranean areas



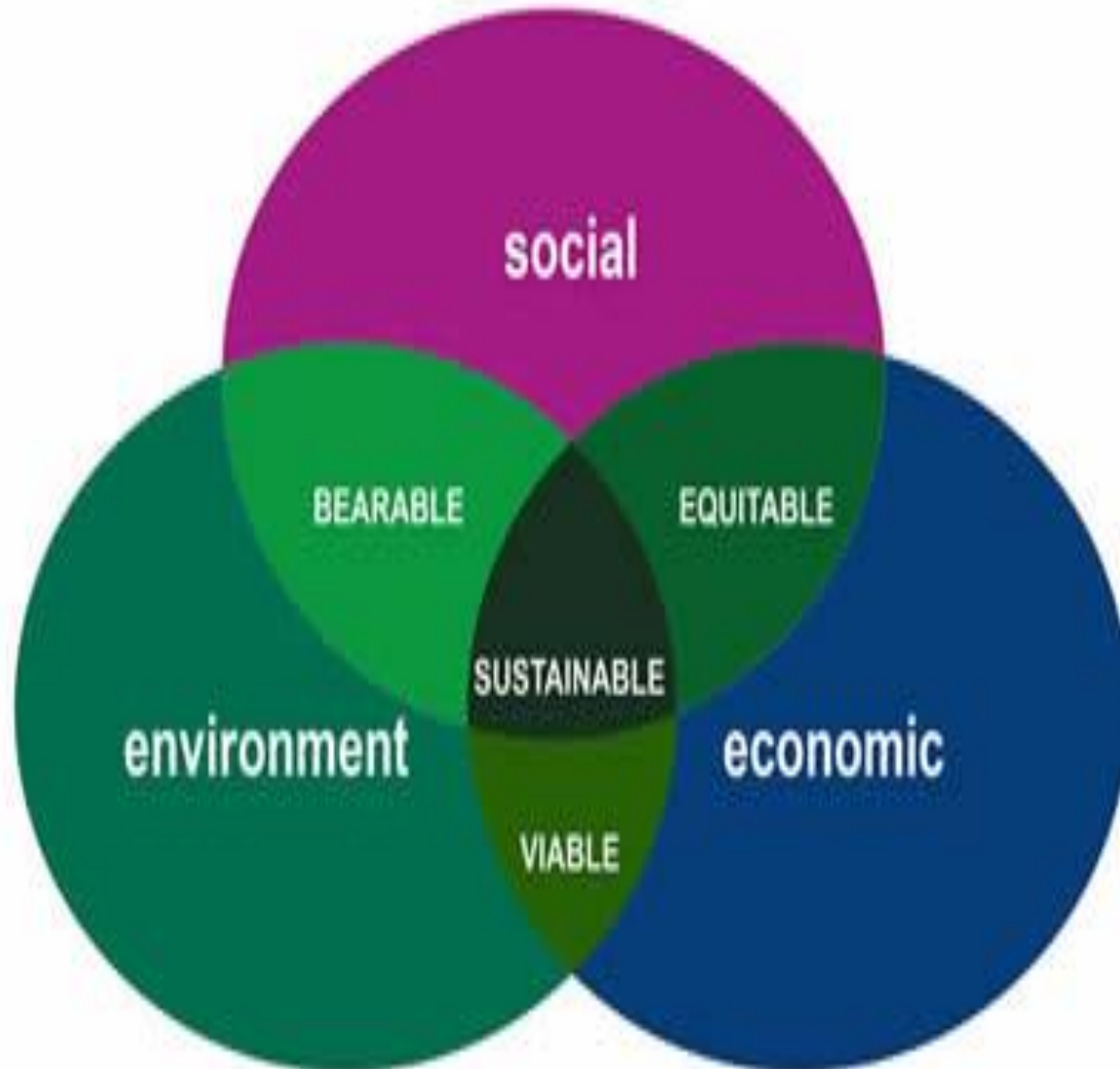
Innovation for Sustainable
Sheep and Goat
Production in Europe



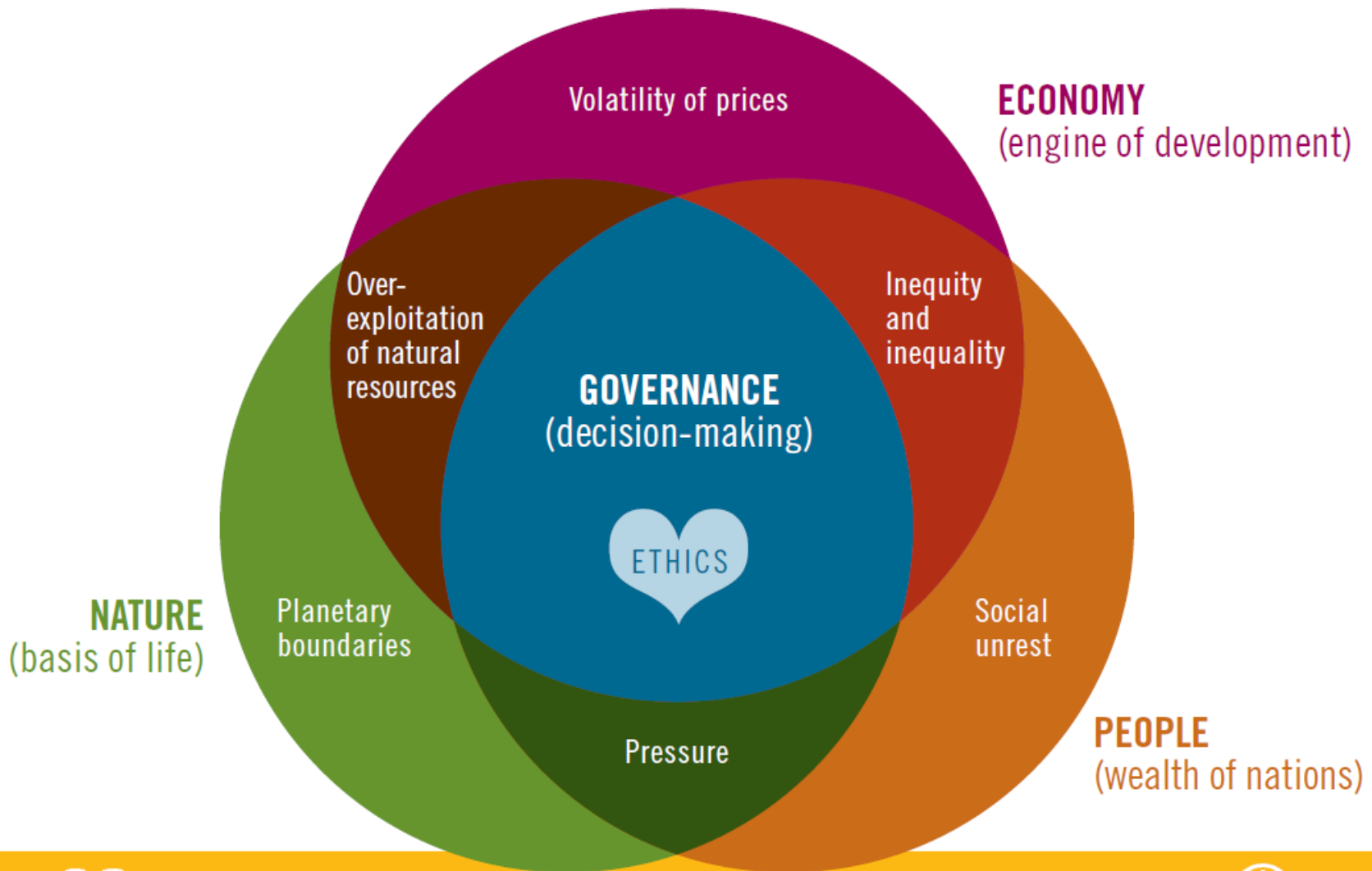
What is farm sustainability?

- The goal of sustainable agriculture is to meet society's food and textile needs in the present without compromising the ability of future generations to meet their own needs.
 - Maintain and enhance the environment
 - Make the most efficient use of non-renewable and on-farm resources
 - Sustain the farm economics
 - Enhance the quality of life for farmers and society as a whole

The three pillars of sustainability



ABOUT SUSTAINABILITY



SAFA SUSTAINABILITY ASSESSMENT OF FOOD AND AGRICULTURE SYSTEMS



ENVIRONMENTAL INTEGRITY

E1 Atmosphere

Greenhouse Gases

Air Quality

E2 Water

Water Withdrawal

Water Quality

E3 Land

Soil Quality

Land Degradation

E4 Biodiversity

Ecosystem Diversity

Species Diversity

Genetic Diversity

E5 Materials and Energy

Material Use

Energy Use

Waste Reduction & Disposal

E6 Animal Welfare

Animal Health

Freedom from Stress



ECONOMIC RESILIENCE

C1 Investment

Internal Investment

Community Investment

Long-Ranging Investment

Profitability

C2 Vulnerability

Stability of Production

Stability of Market

Liquidity

Risk Management

Stability of Supply

C3 Product Quality & Information

Food Safety

Food Quality

Product Information

C4 Local Economy

Value Creation

Local Procurement



SOCIAL WELL-BEING

S1 Decent Livelihood

Right to
Quality of
Life

Capacity
Development

Fair Access
to Means of
Production

S2 Fair Trading Practices

Responsible
Buyers

Rights of
Suppliers

S3 Labour Rights

Employment
Relations

Forced
Labour

Child
Labour

Rights of
Employees

S4 Equity

Non-
discrimination

Gender
Equality

Support to
Vulnerable
People

S5 Human Health & Safety

Workplace
Safety

Public
Health

S6 Cultural Diversity

Indigenous
Knowledge

Food
Sovereignty



GOOD GOVERNANCE

G1 Corporate Ethics

Mission Statement

Due Diligence

G2 Accountability

Holistic Audits

Responsibility

Transparency

G3 Participation

Stakeholder Dialogue

Grievance Procedures

Conflict Resolution

G4 Rule of Law

Legitimacy

Remedy, Restoration & Prevention

Civic Responsibility

Resource Appropriation

G5 Holistic Management

Sustainability Management Plan

Full-Cost Accounting



SAFA RATING SCHEME

| RATING | PERFORMANCE |
|---------------------|---|
| BEST | All operations of the assessed entity comply 80-100% with the sustainability goal, as proven through performance data |
| GOOD | The sustainability goal is reached in 60-80% of operations |
| MODERATE | The sustainability goal is reached in 40-60% of operations |
| LIMITED | The sustainability goal is reached in 20-40% of operations |
| INSUFFICIENT | Operations damage environment and society (goal reached only 0-20%) |



Sustainability assessment tools

| Tool | Full name | Target group | Reference | Origin |
|-------------|---|---|-----------------------|---|
| RISE | Response Inducing Sustainability Evaluation | Farmers | Häni et al. (2003) | Switzerland (Bern University of Applied Sciences) |
| SAFA | Sustainability Assessment of Food and Agriculture Systems | Food and agricultural enterprises, organizations, governments | FAO (2013) | Multiple countries and institutes |
| PG | Public Goods Tool | Farmers, policy-makers | Gerrard et al. (2012) | UK (The Organic Research Centre) |
| IDEA | Indicateurs de Durabilité des Exploitations Agricoles | Farmers, policy-makers, education | Zahm et al. (2008) | France (multiple institutes) |

Sustainability assessment tools

| Min. and max. time requirements | RISE | SAFA | PG | IDEA |
|---------------------------------|-------------|-------------|-------------|------------|
| Preparation | 105–180 min | 10–25 min | 30–60 min | 60–75 min |
| Assessment | 120–165 min | 105–140 min | 75–120 min | 45–90 min |
| Calculation and reporting | 105–525 min | 15 min | 30–60 min | 45–60 min |
| Total assessment | 330–525 min | 125–185 min | 135–240 min | 150–225 mi |

| Tool name | % of respondents with experience of tool |
|--|--|
| PG-Tool | 11.4 |
| CALM (Carbon Accounting for Land Managers) | 8.57 |
| IDEA (Indicateurs de Agriculteurs) | 8.57 |
| LEAF | 8.57 |
| SAFA | 8.57 |
| AssureWel | 5.71 |
| Cool Farm | 5.71 |
| Farm Carbon Calculator | 5.71 |
| MESMIS | 5.71 |
| SimaPro | 5.71 |
| Water Footprint | 5.71 |
| Agroscope (see SALCA) | 2.86 |
| APSIM (agricultural production simulator) | 2.86 |
| CAPRI (Common Agricultural Policy Regionalised Impact) | 2.86 |
| COSA (Committee on Sustainability Assessment) | 2.86 |
| CPLAN | 2.86 |
| DIALECTE | 2.86 |
| EAgRET | 2.86 |
| E-CO2 Project Carbon Assessments | 2.86 |
| EF (ecological footprint) | 2.86 |

PG Tool structure

Quantitative data

- N° animals
- Productivity
- Available land
- Labour
- Incomes
- Sales
- Etc.....

Qualitative data

237 Indicators in 11 Themes

- Animal welfare
- Animal health
- Business resilience
- Social capital
- Agricultural diversity
- Food security
- Energy and carbon
- Fertilizer management
- Water management
- Landscape
- Governance

Driving factors affecting sustainability in dairy goat farms

FARM TYPOLOGIES

- Breeds (5)
- Farm size (3)
- Type of product (2)
- Intensification (2)
- Precision-farming (2)



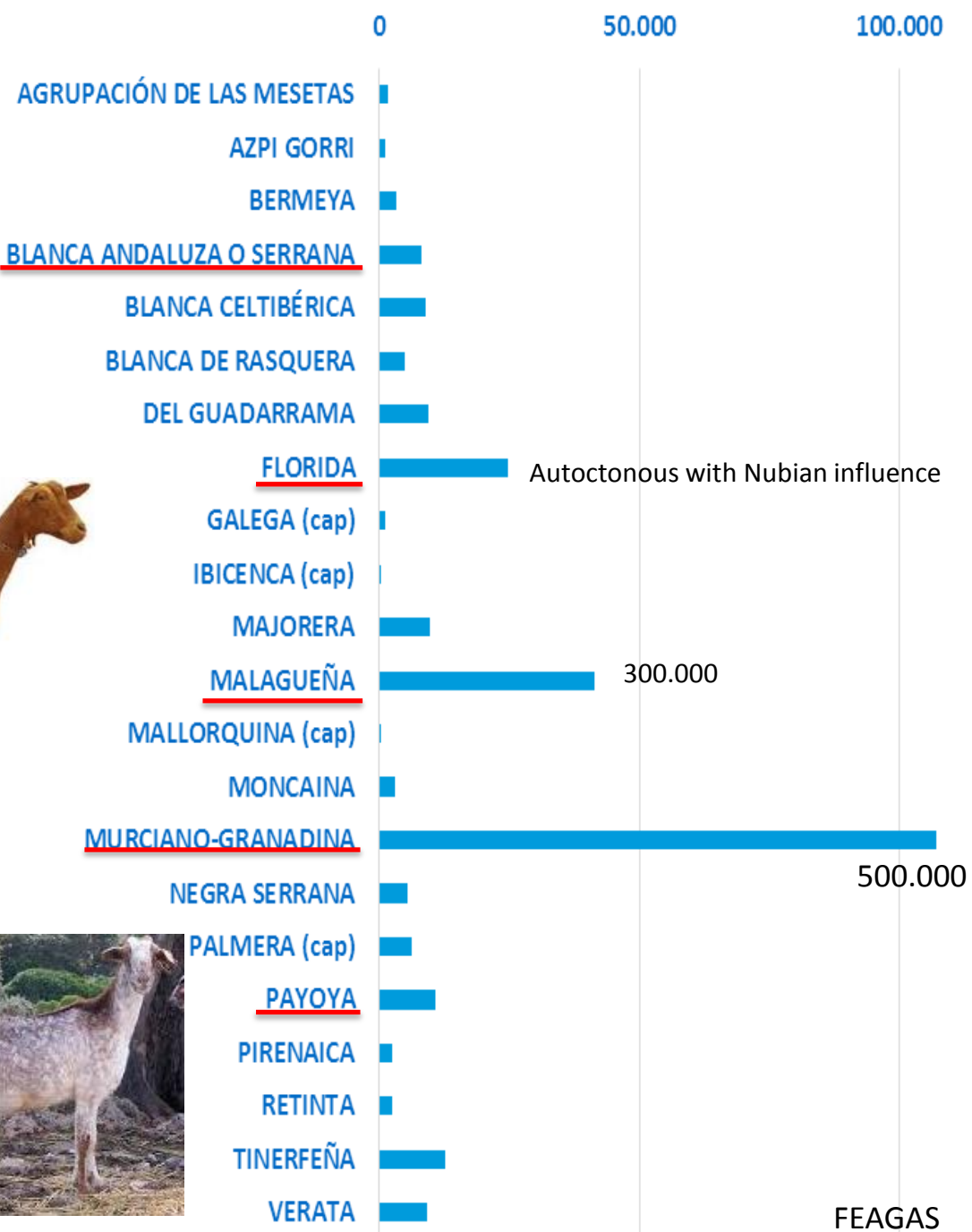
CONSEJO SUPERIOR DE INVESTIGACIONES CIENTÍFICAS



Sustainability assessments

| Location | Breed | Product | Other products | Rep.Goats | Size | Smart-farming | System | Pastoralism | Arable land (ha) | Rep./yr |
|----------|-----------|---------|----------------|-----------|--------|---------------|----------------|-------------|------------------|---------|
| Granada | Granadina | Dairy | Meat | 576 | Medium | ESK | Intensive | No | 1 | 5 |
| Almería | Granadina | Dairy | Cheese, Meat | 550 | Medium | ESK | Intensive | No | 96 | 5 |
| Granada | Granadina | Dairy | Meat | 800 | Big | ESK | Intensive | Yes | 50 | 5 |
| Granada | Granadina | Dairy | Meat | 450 | Medium | ESK | Intensive | No | 10 | 5 |
| Granada | Granadina | Dairy | Cheese, Meat | 1200 | Big | ESK | Semi-extensive | Yes | 400 | 3 |
| Almería | Granadina | Dairy | Meat | 250 | Small | ESK | Intensive | No | 1 | 5 |
| Granada | Florida | Dairy | Cheese, Meat | 156 | Small | No | Intensive | No | 2 | 2 |
| Sevilla | Florida | Dairy | Meat | 337 | Medium | No | Semi-extensive | Yes | 7 | 2 |
| Cordoba | Florida | Dairy | Meat | 200 | Small | No | Semi-extensive | Yes | 124 | 2 |
| Málaga | Malagueña | Dairy | Meat | 170 | Small | No | Semi-extensive | Yes | 53 | 1 |
| Jaén | Malagueña | Dairy | Meat | 1000 | Big | ESK | Intensive | No | 30 | 5 |
| Málaga | Malagueña | Dairy | Meat | 240 | Small | ESK | Semi-extensive | Yes | 67 | 3 |
| Málaga | Malagueña | Dairy | Meat | 360 | Medium | No | Semi-extensive | Yes | 65 | 3 |
| Málaga | Malagueña | Dairy | Cheese, Meat | 292 | Medium | ESK | Semi-extensive | Yes | 340 | 3 |
| Sevilla | Payoya | Dairy | Meat | 400 | Medium | ESK | Intensive | No | 228 | 4 |
| Huelva | Payoya | Dairy | Meat | 600 | Medium | No | Semi-extensive | Yes | 998 | 2 |
| Sevilla | Blanca | Meat | Meat | 468 | Medium | No | Semi-extensive | Yes | 235 | 1 |
| Badajoz | Blanca | Meat | Dairy | 1170 | Big | No | Semi-extensive | Yes | 900 | 2 |
| Jaén | Blanca | Meat | Meat | 463 | Medium | No | Semi-extensive | Yes | 610 | 2 |
| Jaén | Blanca | Meat | Meat | 1640 | Big | No | Semi-extensive | Yes | 2111 | 1 |

Meat



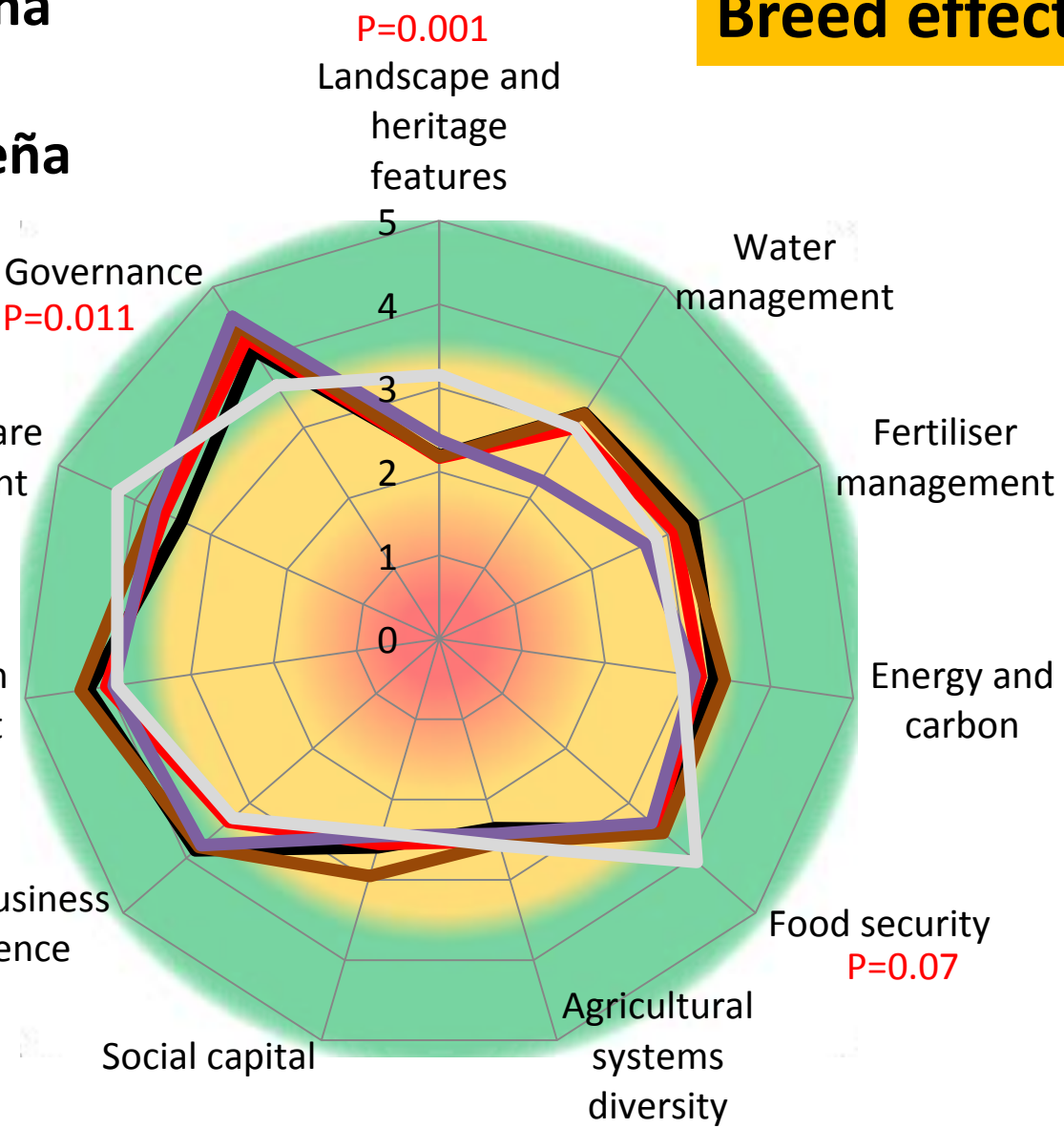
Dairy

FEAGAS

Breed effect

Overall
P=0.455

- Granadina
- Florida
- Malagueña
- Payoya
- Blanca



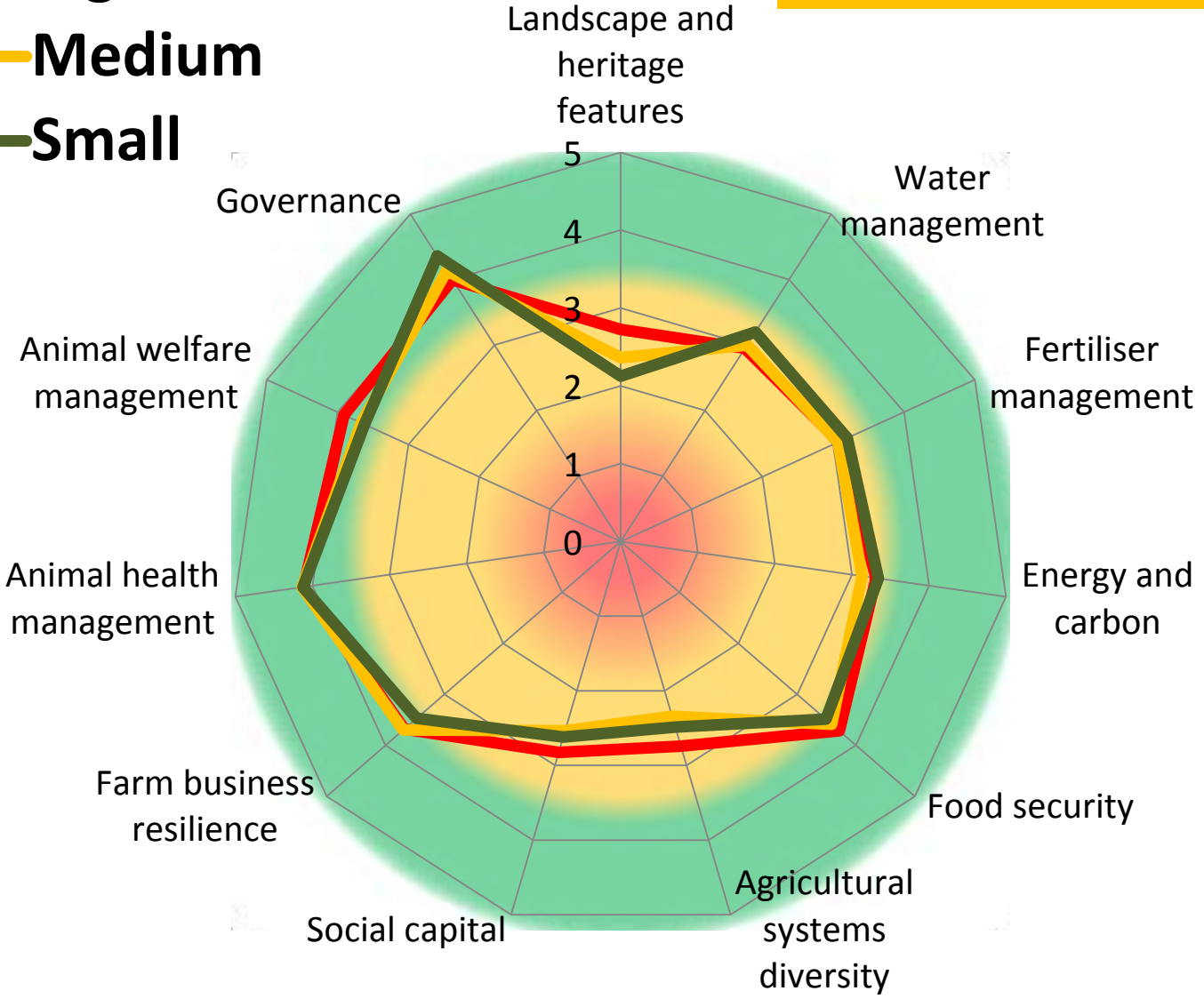
+Natural behaviour
-Housing

Staff resources

Farm size effect

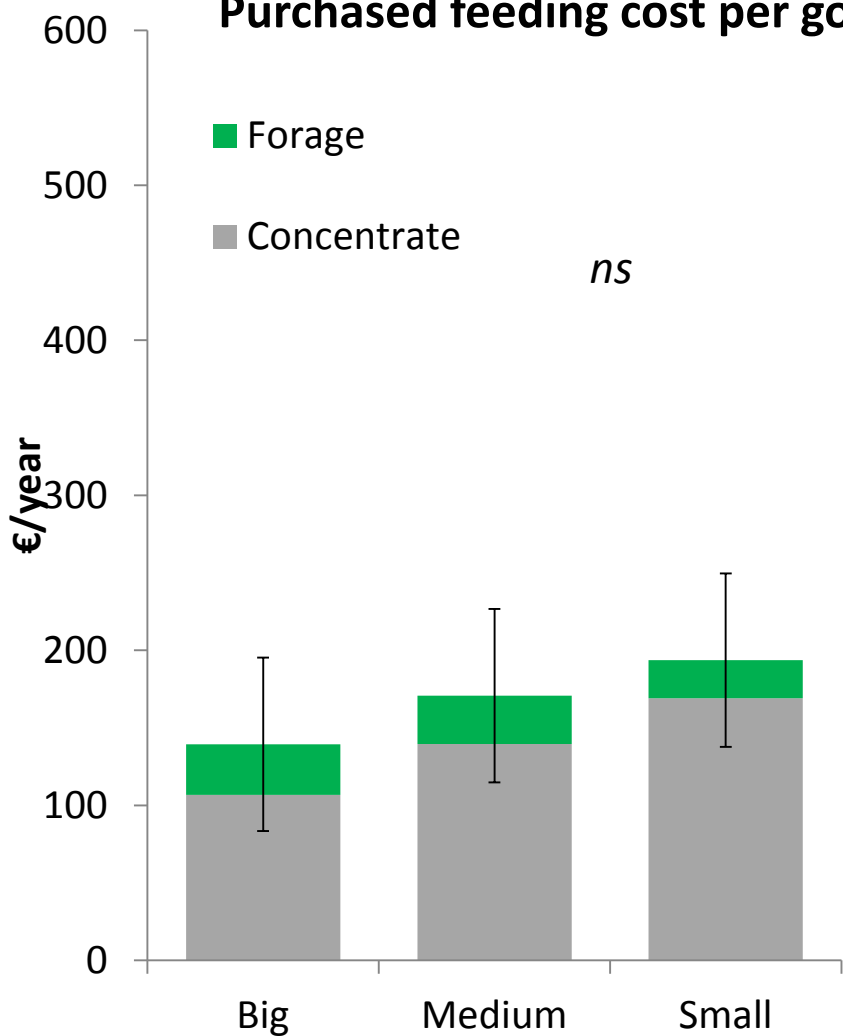
Overall
P=0.651

- >800 **Big** (Red line)
- 300-600 **Medium** (Yellow line)
- <250 **Small** (Green line)

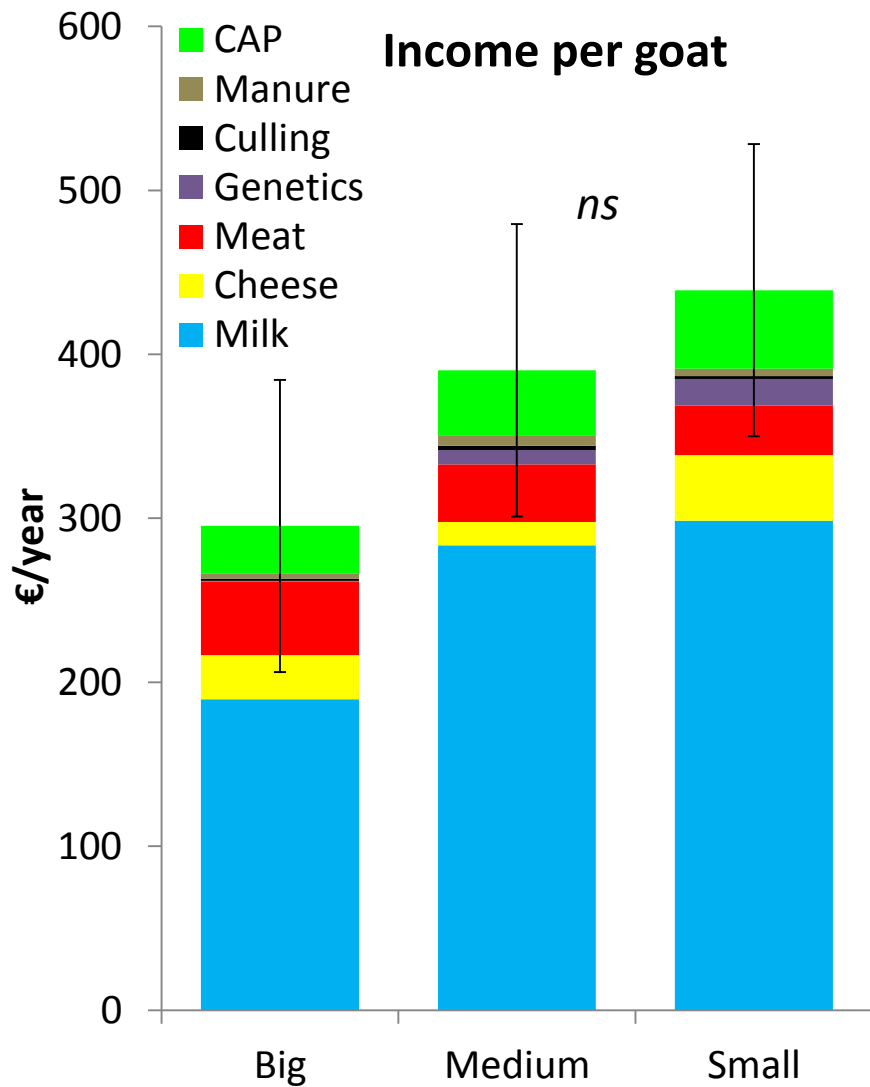


Farm size effect

Purchased feeding cost per goat



Income per goat



— Dairy
— Meat

Type of product

Overall
P=0.698

Landscape
Genetic heritage

Landscape and
heritage features
P<0.001

New practices/technology

Governance
P=0.011

Animal welfare
management
P=0.01

+Natural behaviour
-Housing

Biosecurity

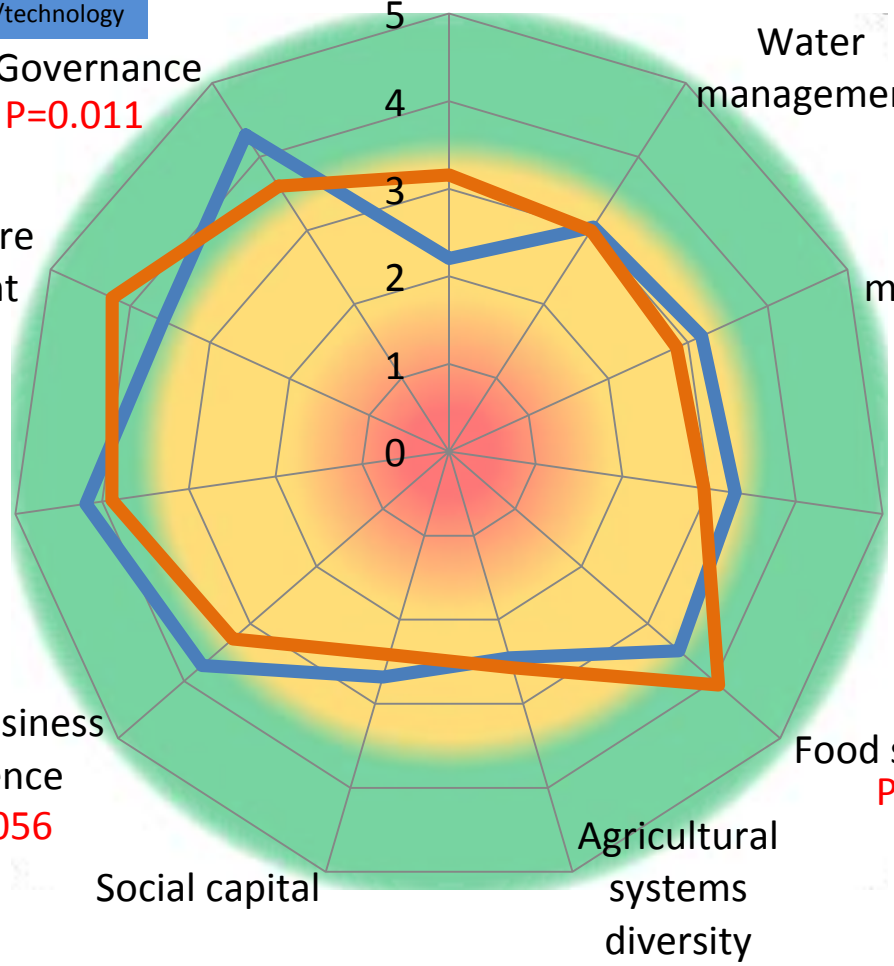
Animal health
management
P=0.023

Vision/Strategy
Networking

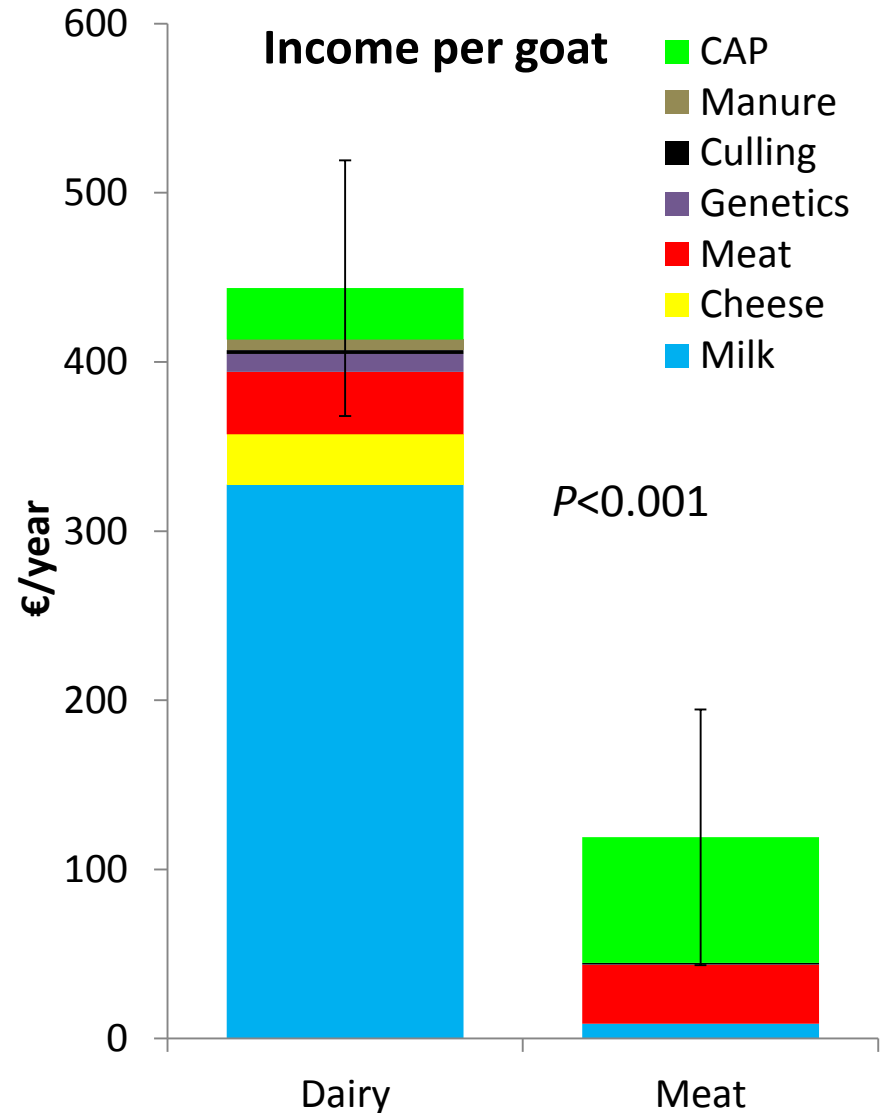
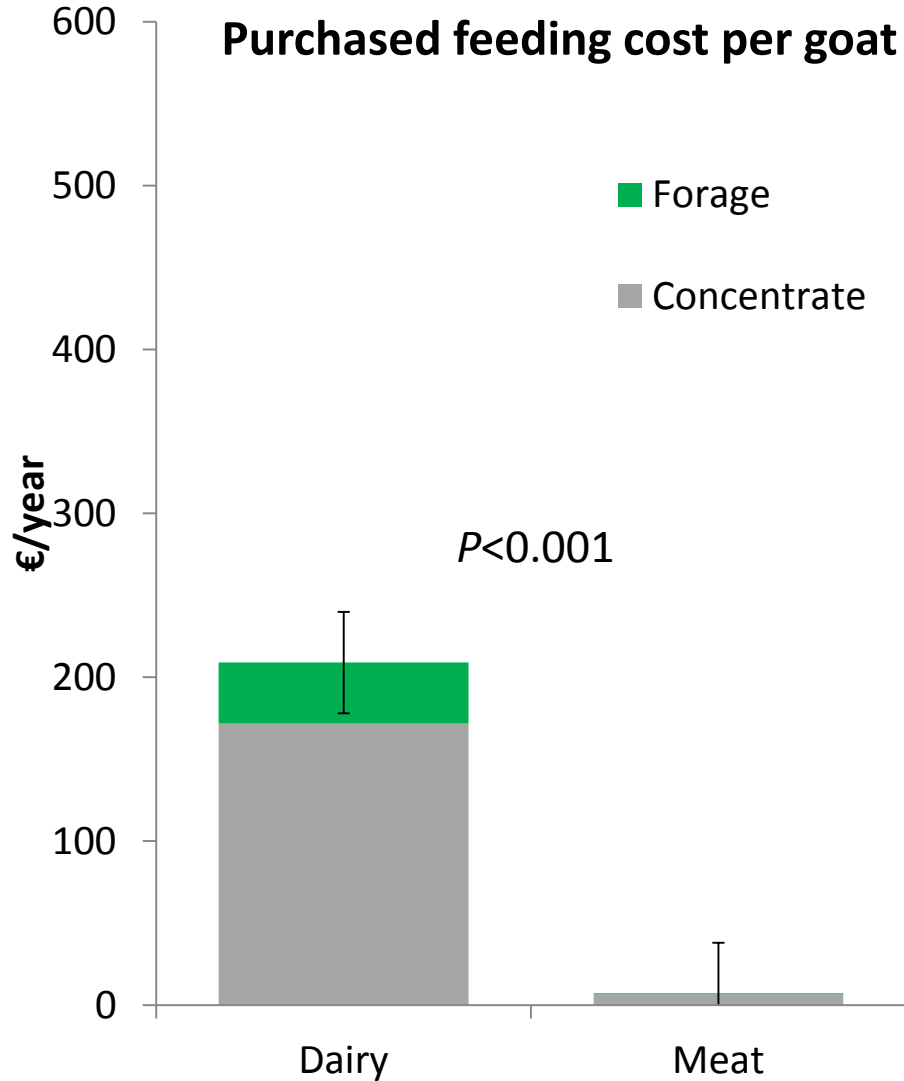
Farm business
resilience
P=0.056

Purchased feeds
Local market

Food security
P=0.003



Type of product



— Intensive

— Semi

Production system

Overall
P=0.142

Landscape

Landscape and heritage features
P=0.068

Water management

Fertiliser management

Energy and carbon

Food security
P=0.022

Purchased feeds

Agricultural systems diversity

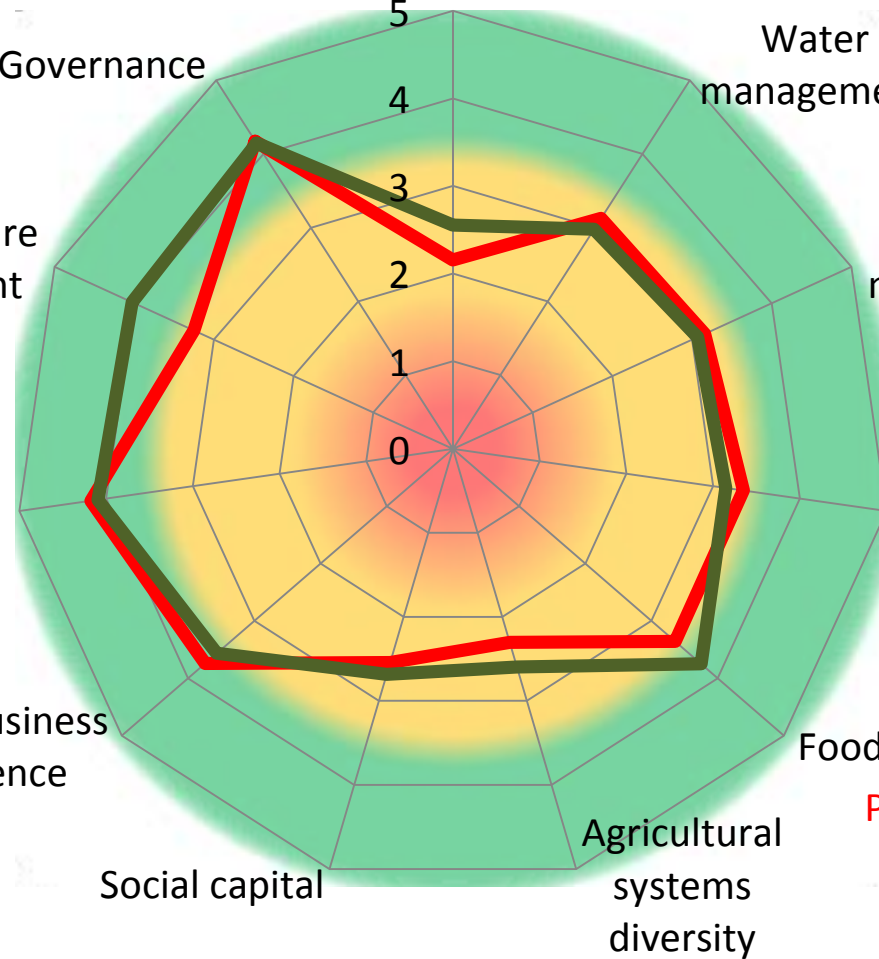
Social capital

Farm business resilience

Animal health management

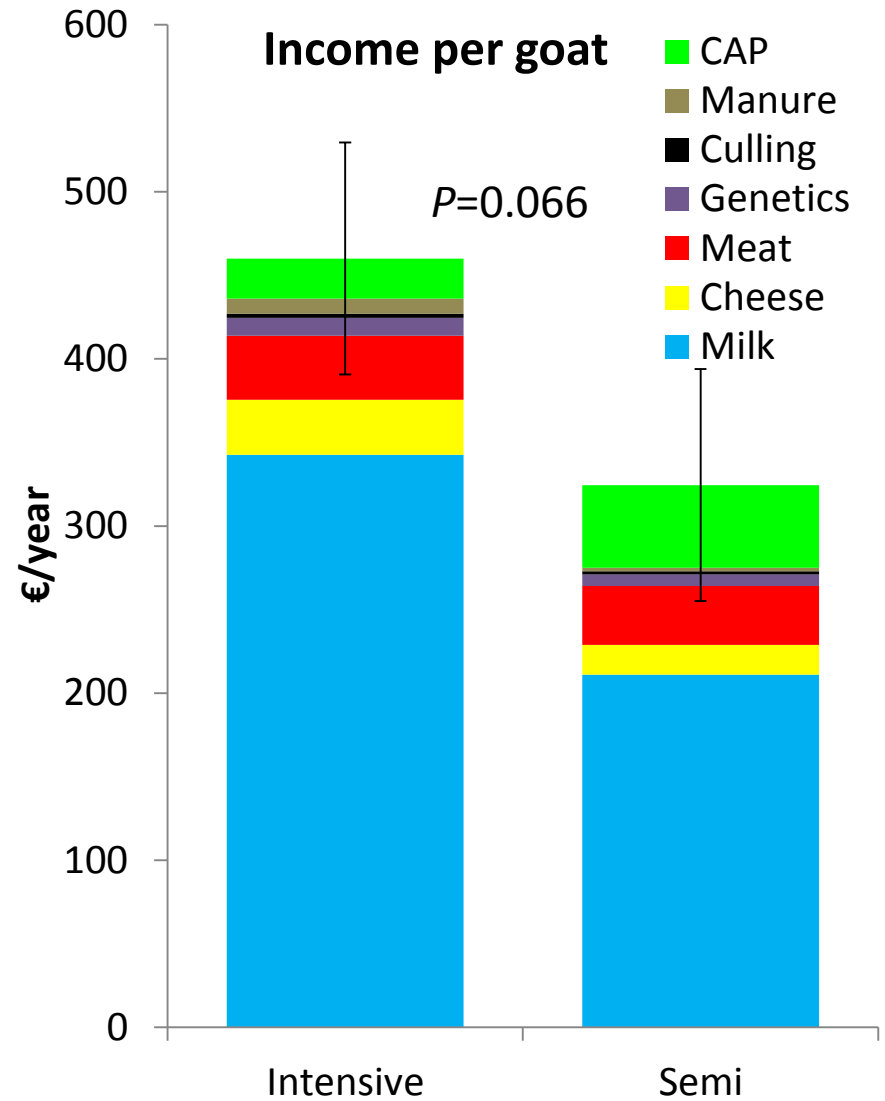
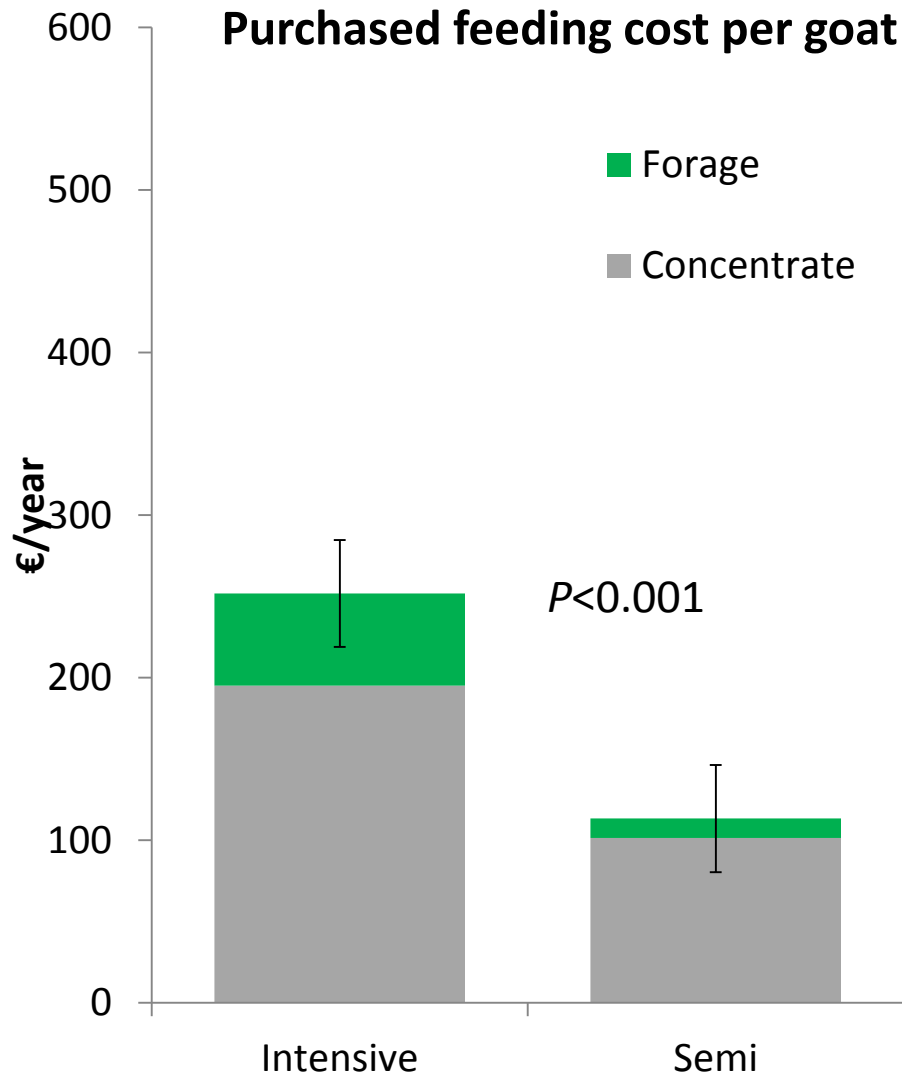
Animal welfare management
P<0.001

Governance



Natural behaviour

Production system



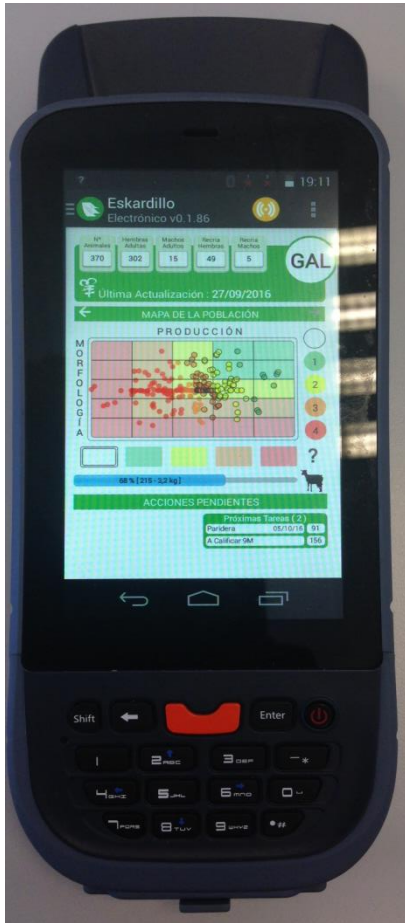
Innovation: Precision Livestock Farming (PLF)

Data collection

Chip reader
Barcode reader
Digital camera
Keyboard for farmer inputs
Milk control
Morphological evaluation

Data Processing

Feedback to the farmer

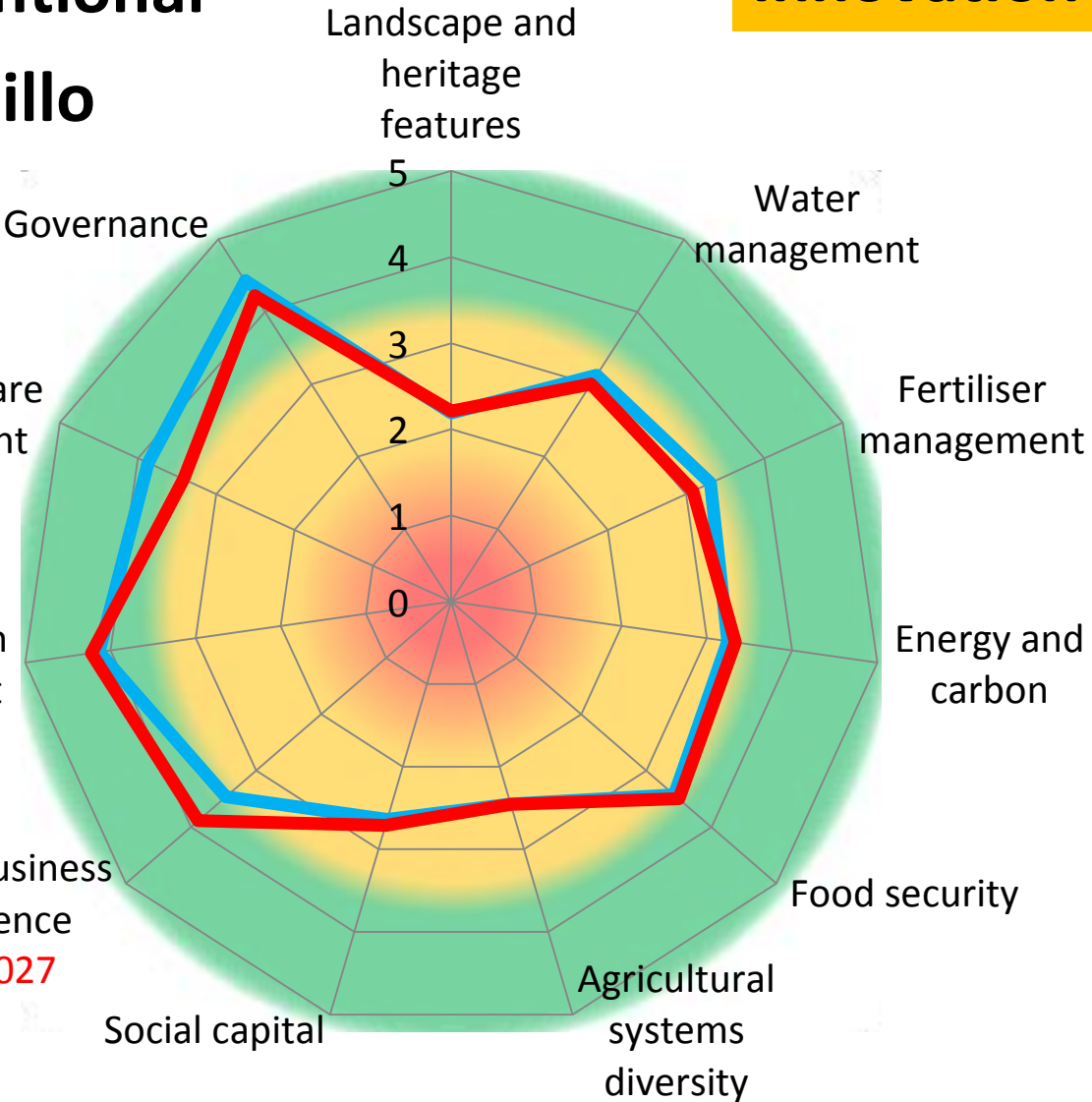


— Conventional

— Eskardillo

Innovation

Overall
P=0.839



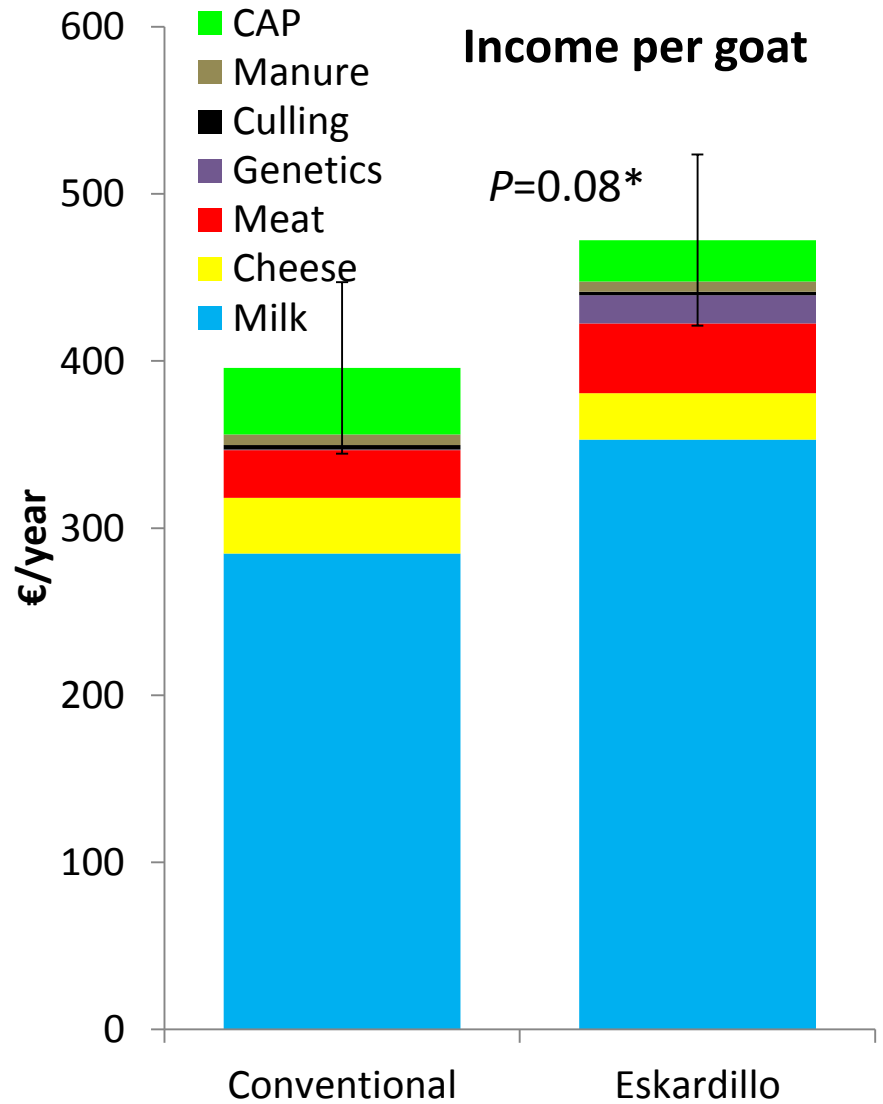
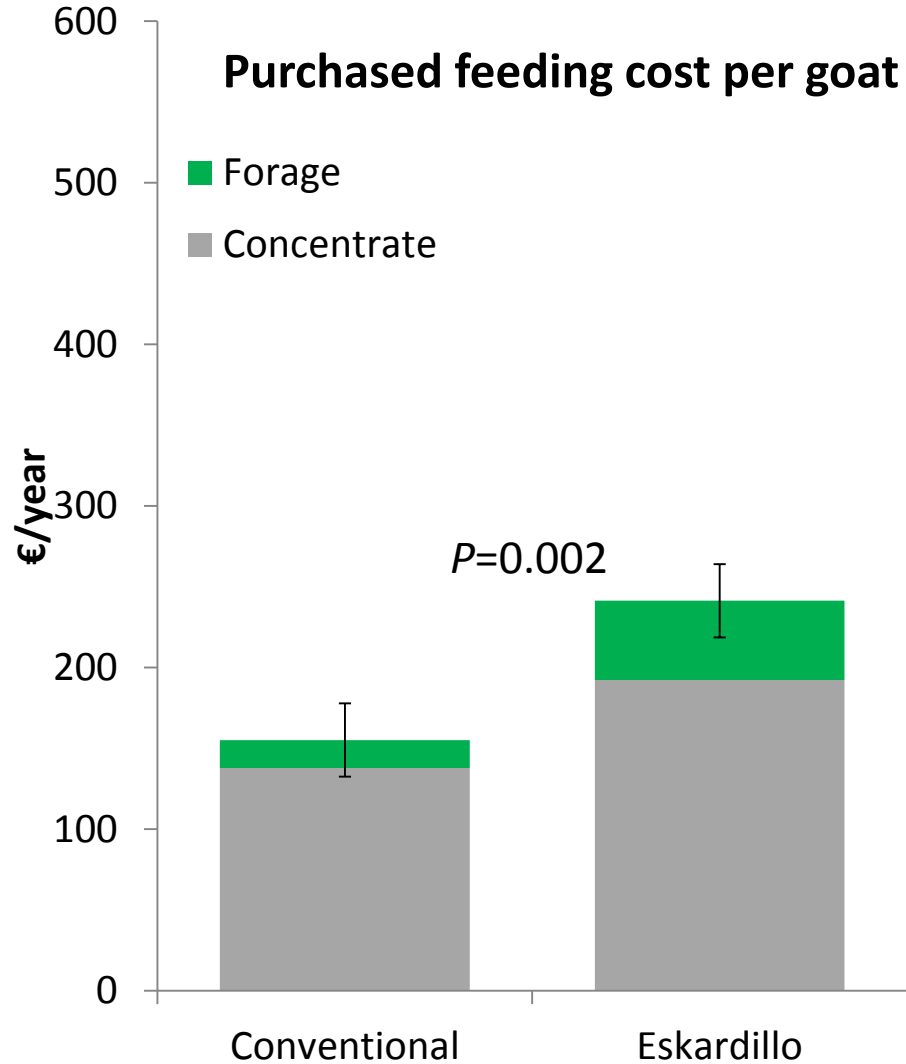
Natural behaviour

P=0.036

Vision/Strategy
Networking

P=0.027

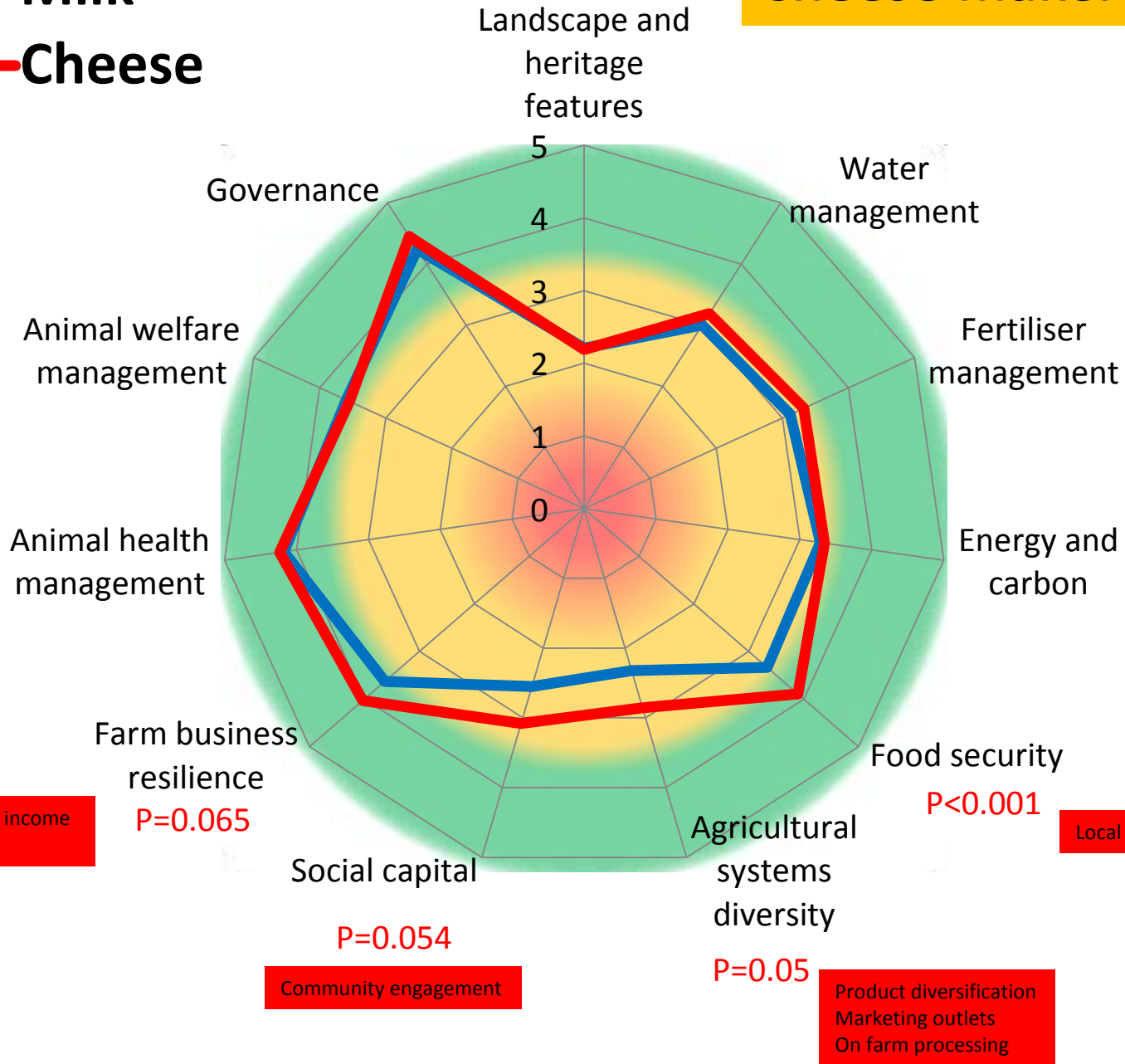
Innovation



—Milk
—Cheese

Cheese maker

Overall
P=0.091



Sources of income
Flexibility

P=0.065

Local market

P<0.001

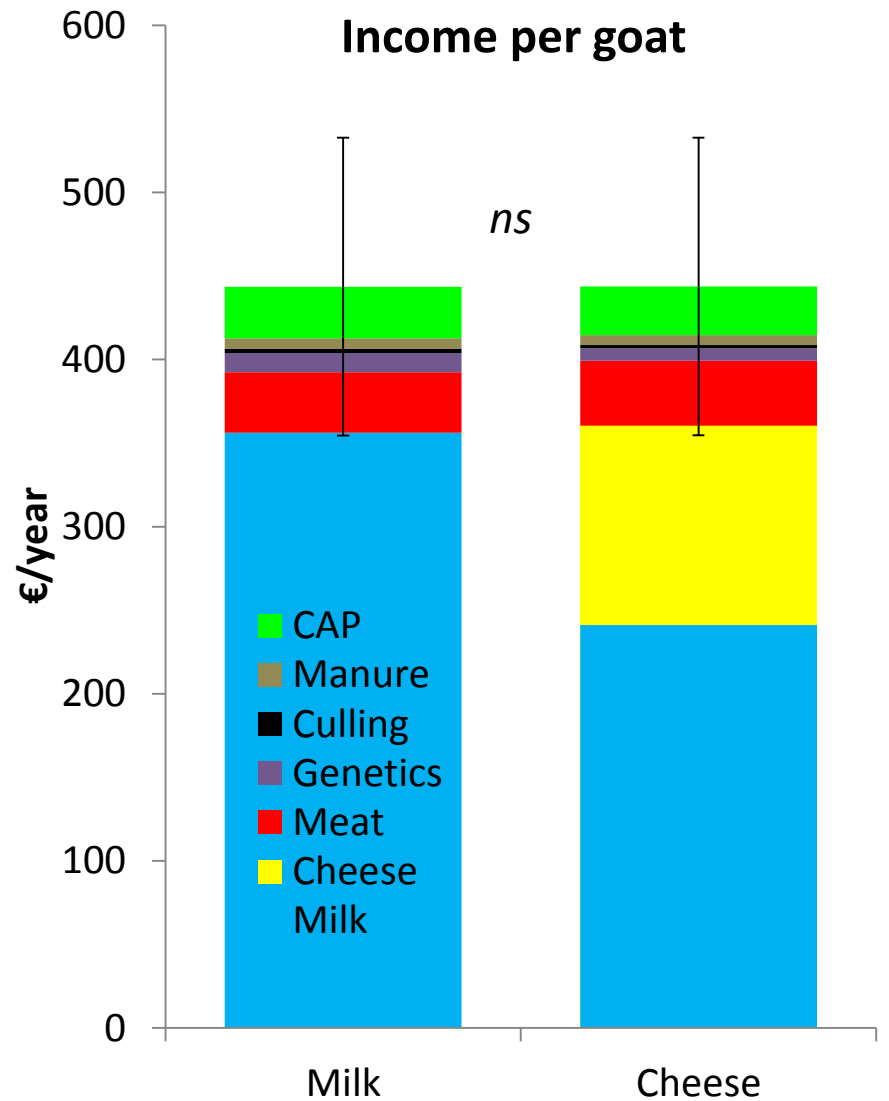
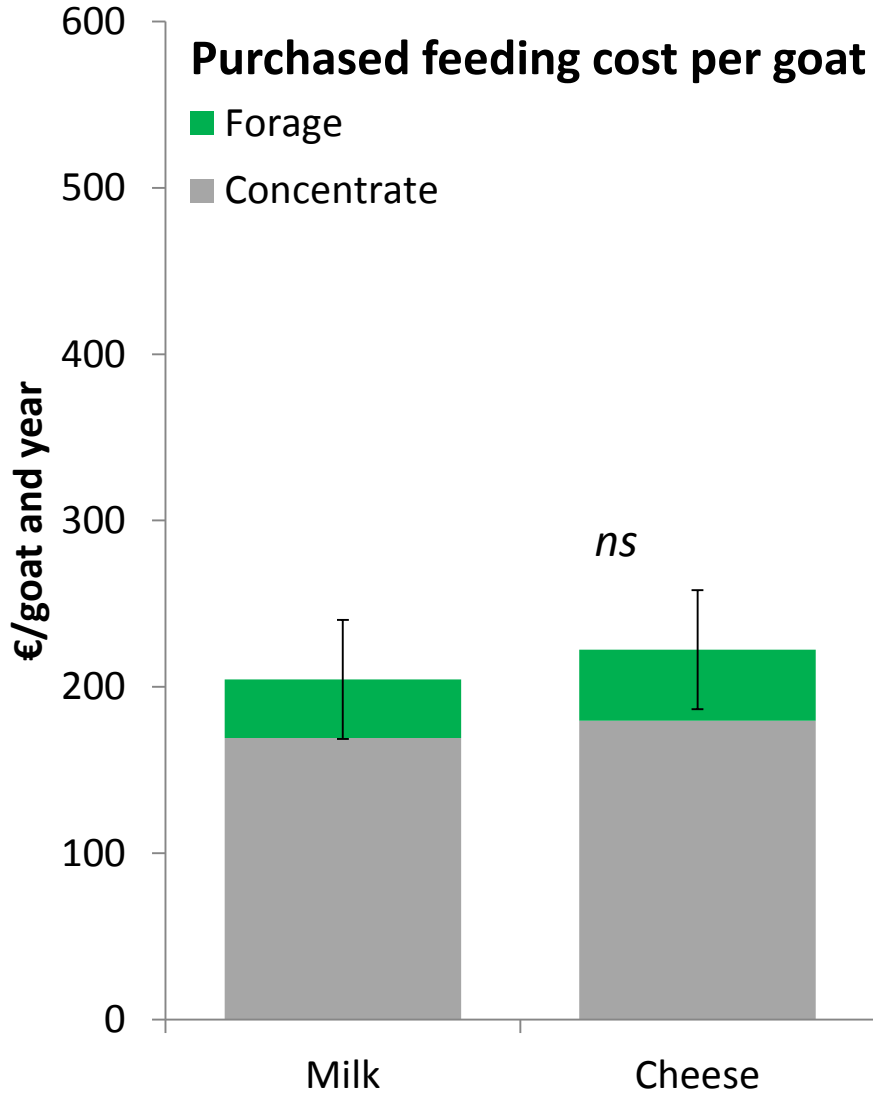
Community engagement

P=0.054

Product diversification
Marketing outlets
On farm processing

P=0.05

Cheese maker



Take home message

- Sustainability is a broad term which includes environmental but also economic and social aspects which are key for the farm long-term viability
- This case study allowed to identify the strengths and limitations for each farm typology. However, there are not evidences that specific farm typologies lead to higher sustainably scores.
- On the contrary, it seems that farm sustainability mostly depends on the farmer's attitude and good practices
- As a result, more effort must be focused on promoting farmers professionalization in the Spanish dairy goat sector

Thank you



Innovation for Sustainable
Sheep and Goat
Production in Europe

