# CLIMED - Crop Livestock Integration in the MEDiterranean project

## Mid term achievements in Morocco

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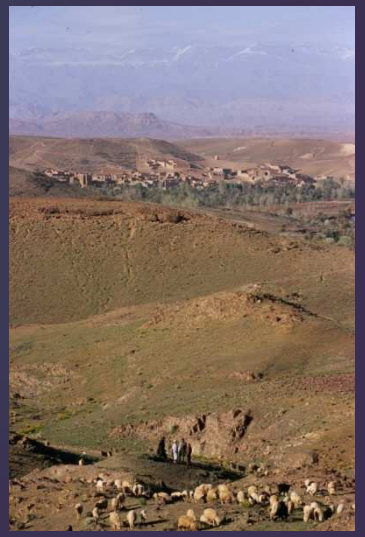
# CLIMED Project in Morocco

## Effective beginning – January 2014 …

Preliminary works in spring 2013

Almost 50% of funds less than initially demanded …

Fields: the Gharb irrigation scheme and Ouarzazate oasis



## Main achievements in the Gharb irrigation scheme

- a series of on farm follow-up practices;
- the determination of cattle milk production cost;
- the study of work constraint management.

# CLIMED Project in Morocco

## Supervision of three Master thesis

Sannito Y. 2013. Feed availability and its relationship to cattle dietary rations and milk yield

El Aouad N. 2014. Milk production cost and its seasonal variations in the Gharb scheme

Ghabiyel Y. 2014. Managing work constraints in mixed crop/livestock farms

## Publications

SRAIRI M. T., CHERGUI S., IGUELD H., SANNITO Y. 2013. Les évolutions récentes du contexte de l'élevage bovin au Maroc et leurs effets sur sa durabilité. Revue de l'Elevage et de Médecine vétérinaire des Pays tropicaux. Accepted.

SRAIRI M. T., SANNITO Y. TOURRAND J.F. 2014. Investigating the setbacks in conventional dairy farms by the follow-up of their potential and effective milk yields. Iranian Journal of Applied Animal Science. Accepted.

# Ouarzazate oases: Resilience & Co-viability

**Resilience : Yes**

Climate Change Adaptation

Go out to find other pasture in order to preserve local pasture/rangeland (seasonal migration, …)

*Aoudal* System: sustainable rangeland management based on the control of access

Relationships in the *douar,* including local settlers (no pastoral households)

**Climate change: reducing of rainfall and pasture (quality and quantity), disappearance of some plants + overgrazing**

**Resilience : No**

No adaptation to Climate Change

- No change in the rangeland management
  => Low rainfall + overgrazing = degradation
- No diversified activities = no reducing pressure
- Wood extraction for housing use (juniper trees)
- No restrictive rules for the users (breeders and others)

***Aoudal* System: conditioned by rainfall (no rain = no access) and if regular rainfall, access based on the concurrence between the tribes**

# Ouarzazate oases: Resilience & Co-viability

## Co-viability of socio-ecosystems

- Lack of regulation leads to rangeland practices with negative impacts on natural resources

- Care the rangeland today to survive tomorrow

- Viability of pastoral system depends on ecosystem viability

- Sustainable rangeland management = need to go out the rangeland during winter

- Great challenge = Control the access to the rangeland according to the ecological cycle and human needs

Local demand: implementation of specific and shared/negotiated regulation, accepted by both local and national groups aiming to sustainable rangeland management as the base of socio-ecosystem (including exogenous mediation)

Socio-ecosystem Pact/Agreement

# Milk production cost in the Gharb area: seasonal effect

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# Introduction

## Milk production cost: a crucial indicator for any activty

Understanding production processes

Assessing economic performances

Adopting correction measures…

## Difficulties of applying this to dairy production in Morocco:

- fragmented offer;
- dual purpose production;
- scarce reliable data.

# Introduction

## The Gharb: a crucial agricultural region in Morocco

**Fertile soils, sufficient rainfall, vicinity to consumption centers …**

# Introduction

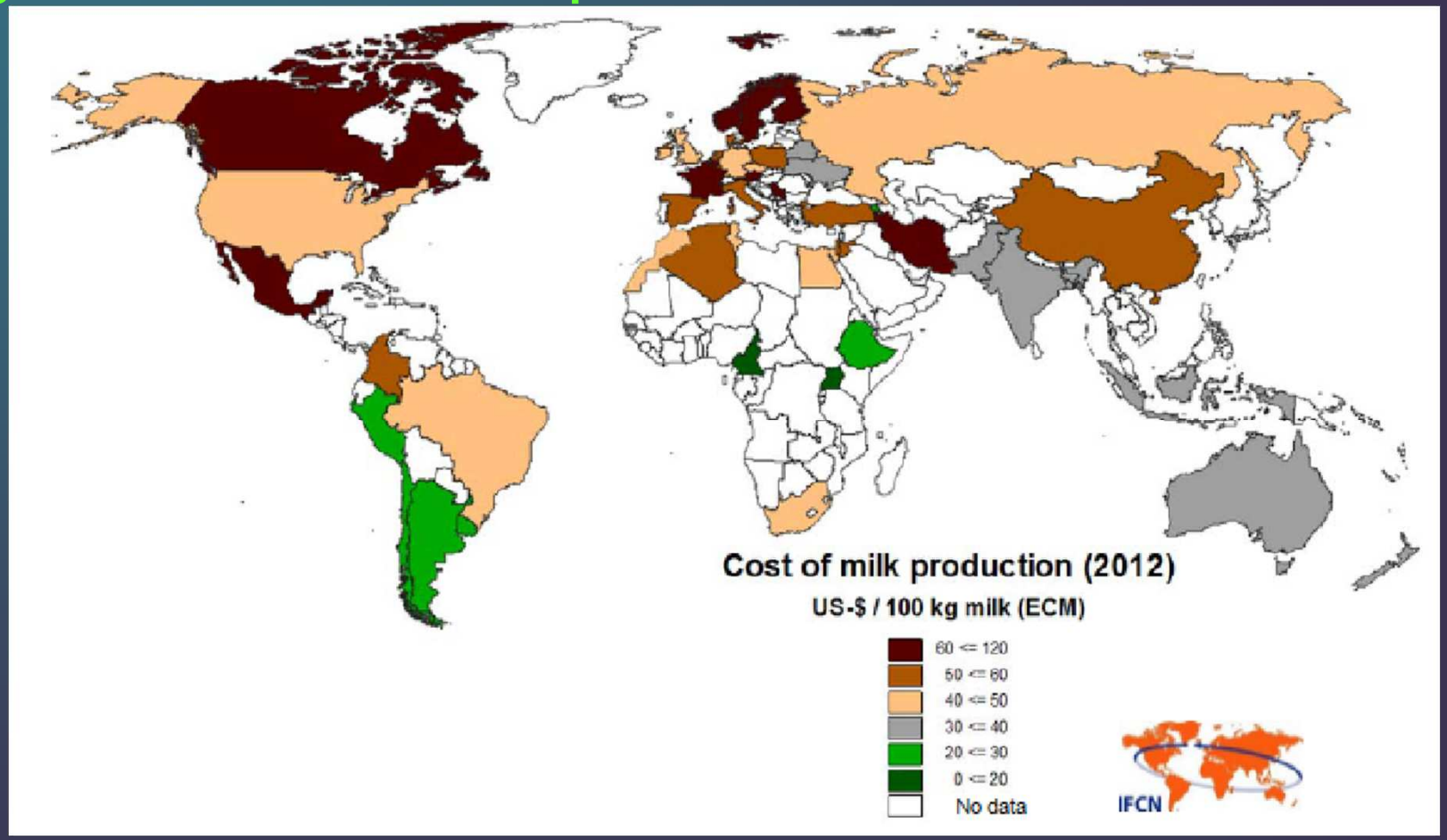
## Recent evolutions of the context

- Soaring prices of inputs
- Stagnating « farm gate » milk price
- Increasing demands for better wages
- Marked climate uncertainty and effects on fodder output
- Stagnating milk yields…

**Which profitability? Affected by seasonal variations?**

# Introduction

## A global benchmark of milk production costs




**An average global milk production cost: 0,34 €/l (IFCN, 2013)**

**Extreme values:** **Minimum – 0.22 €/l in Argentine, Uruguay, Ethiopia…**
**Maximum – 0.95 €/l in Japan.**

**Maghreb region: high milk costs – few pastures (Ndambi *et al*., 2009).**

# Methodology

## Milk production cost in the Gharb region

19 farms, of which a majority with limited land (from 1 to 15 ha)

No examples of large farms

Assessment realized in late winter and late spring 2014 …


**MPC = (TI – CBY) / Milk Yield**

MPC: Milk Production Cost  TI: Total Inputs  CBY: Cattle ByProducts (Value of Calves, Heifers, and Culled Cows' Sales)

# Methodology

## Milk production cost in the Gharb region

### Inputs corresponding to 1 day of production

Fodder expenses (seeds, irrigation, fertilization, etc.) and of days of distribution

Feed concentrates purchases

Work (family and off-farm)

AI costs and veterinary treatments

Diverse costs (energy, litter, etc.)

Investments' amortization: projects size…

Milk by-products: sales of calves, heifers and culled cows.

**Two methods used to determine MPC:**

1) all the inputs including family members' wages and investments' amortization;
2) without family members' wages and investments' amortization.

# Results

## Farms' structural parameters

| | Late winter | Late spring |
|---|---|---|
| Fodder area (ha) | 6.4 (0.3 – 35.0) | 6.4 (0.3 – 35.0) |
| Cows in the herd | 8.7 (2.0 – 21.0) | 7.0 (2.0 – 19.0) |
| Growing calves | 5.1 (0 – 15) | 3.8 (0 – 10) |
| Heifers | 1.0 (0 – 7) | 1.0 (0 – 6) |
| Cattle load (LU/ha) | 3.7 (0.5 – 15.6) | 3.7 (0.5 – 14.4) |
| Average milk yield (l/vache/j) | 13.4 (5.0 – 24.0) | 14.5 (3.7 – 28.0) |

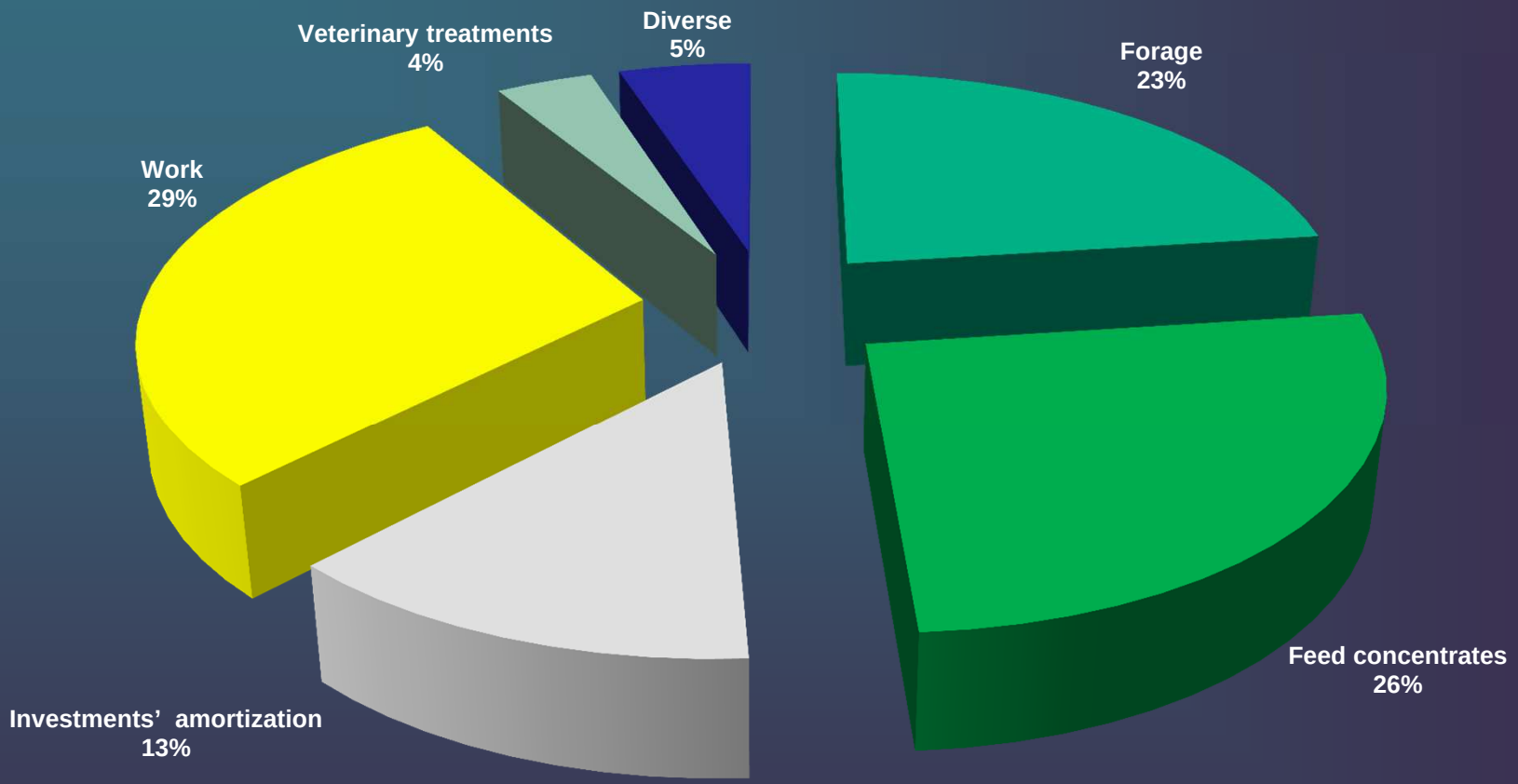
Mainly smallholder farms … Some larger farms: impact on average values

Purebred Holstein herds, and some herds with crossbred (Holstein x local) cows

Cattle load of 3.7 LU per ha: nutrients' supply to cattle?

# Results

## Structure of milk production cost in the Gharb zone (winter) - Scenario 1



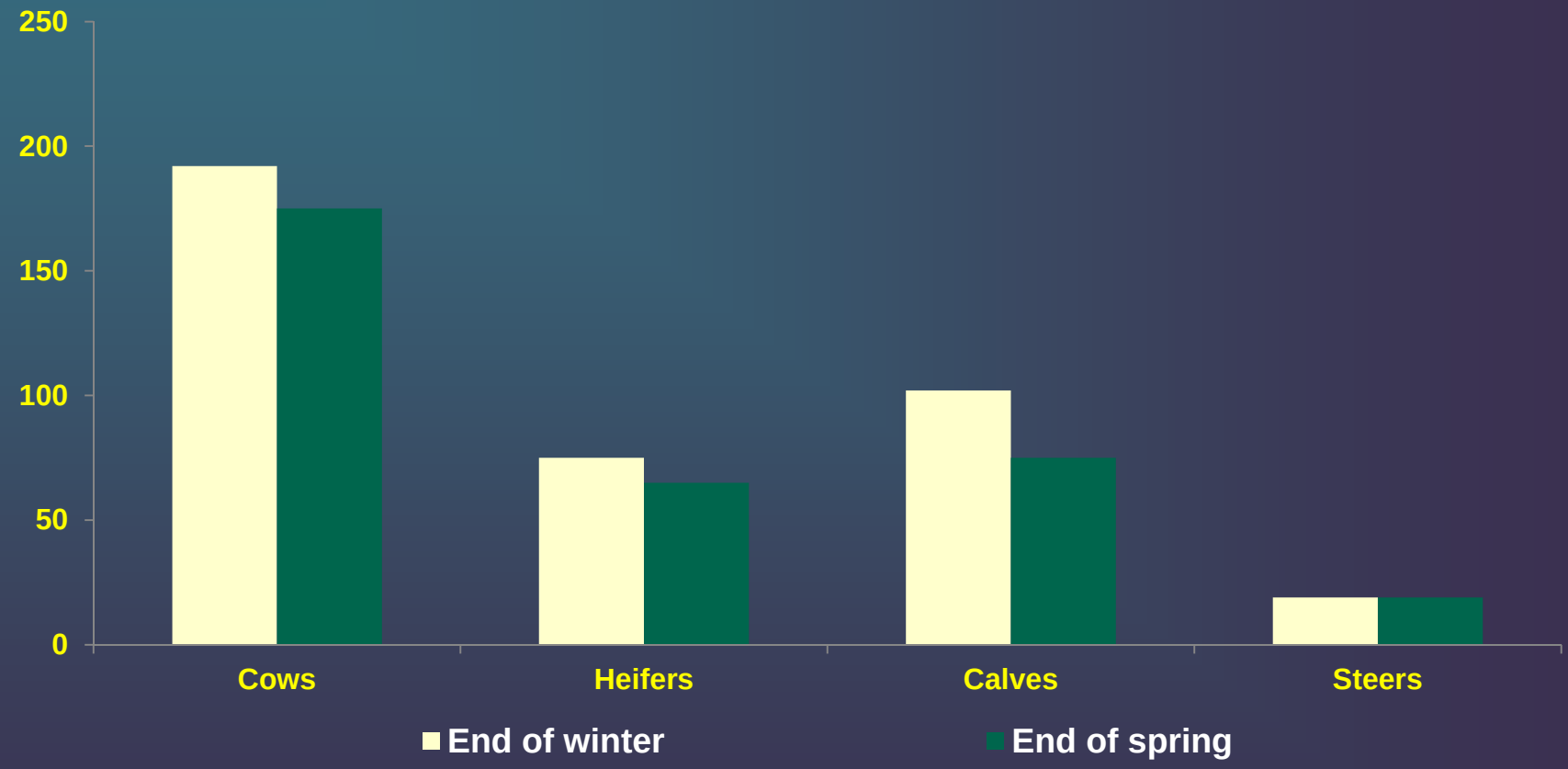

**Feed costs: almost 50% of total inputs – Less than values reported by previous works**

**Emergence of labor and investments' amortzation…**

**15 farms of the 19 show a MPC higher than « farm gate » milk price: profitability?**

# Results

## Comparison of the herd's composition between the two seasons




**Sales of cattle to decrease the animal load**
**A way to try to reach an economic balance …**

# Results

## Comparison of Milk Production costs' structure between the two seasons (DH/litre)

| | Late winter | Late spring |
|---|---|---|
| **Feed concentrates** | 1.44 | **2.13** |
| **Fodder** | 1.20 | 1.21 |
| **Labor** | 1.59 | 1.65 |
| **Investments' amortization** | 0.72 | 0.88 |
| **AI and veterinary treatments** | 0.20 | 0.27 |
| **Diverse inputs** | 0.24 | 0.21 |
| **Milk by-products** | 1.39 | **1.94** |
| **Milk Production Cost** | **4.00** | **4.41** |
| **Milk Production Cost wthout Cattle Sales** | **5.37** | **6.35** |

# Results

## Milk production cost in the Gharb region

Average « winter price »: 4.00 DH/litre (around 0.37 €)

Average « spring price »: 4.41 DH/litre (around 0.40 €)

## Higher price in the dry season

Fodder: less quality (stubble, wheat , hay, etc.)

More feed concentrates used

Additional veterinary treatments

Decrease in milk yield

# Results

## Global situation: Germany and France

### Website: *www.europeanmilkboard.org*

***Germany: Databases studied from 2002 to 2009***

**Average cost: respectively 0.43, 0.51 and 0.45 €/litre, in the North, South and East**

***France: Databases studied from 2004 to 2009***

**Average cost: 0.40 to 0.45 €/litre.**

**A deficit of 8 cents per litre ⇢ Economic losses**


**Lobbies: a « farm gate » milk price equal to 0.45 €/litre: economic sustainability.**

# Conclusion

## Milk production cost in the Gharb area

### Economic difficulties in conventional farms

Many farms with significant losses.

Even in the spring time. Which situation in periods of scarce forage?

Scenario # 2 – Better results, but:

- without paying family members (280 h/ton of milk - Sraïri *et al*., 2013) ;
- no possibility of renewing production tools.

Financial and social vulnerability

What about the future? Which resilience of the dairy activity?

Challenges of the dairy chain: milk quality, value chain, etc.

Dairy cattle: Just non economic roles?

Can it contribute to improve farms' profitability?

# Managing work constraints in mixed crop/livestock farms in the Gharb irrigation scheme

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# Introduction

**Three main production factors in agriculture:**

**Land**

**Capital**

**Work**

**Developing countries: land and capital constraints**

- **Work considered as available and cheap**
- **Emerging constraint in farming systems**
- **Work load and work payment?**

# Objectives of the study

- Work time corresponding to various crops and livestock actvities
- Managing the on-farm work availability with regard to tasks
- Incomes generated in relationship to the work achieved
- Work: an actual constraint within crop/livestock farms?

# Methodology

14 farms: a diversity of crop/livestock systems

Various sizes and strategic options

Different work management: family members and/or off-farm manpower

## Data collection

- Farm structure
- Tasks achieved: Who? When?
- Duration of tasks' achievements
- Incomes generated by crops and livestock.

- Determination of key parameters in relation to work management within frams

# Methodology

**Data treatment and statistical analyses**

**Individual analysis: *Work Assessment* method applied in farms (Dedieu *et al.*,2000)**

**Types of workers**

| Family members | Off farm workers |
|---|---|
| Permanent workers within the farms, relatives of the owner | Workers with no family relation to the owner |

**Main tasks within the farm**

| Routine tasks | Seasonal tasks |
|---|---|
| Daily work related to the herd (Feeding, Watering, Milking the cows, Cutting fodder, etc.) | Related to crops (Sowing, Fertlizing, Irrigating, Harvesting, etc.) |

# Results

## Farms' structural parameters

| | Mean value (Min. – Max.) |
|---|---|
| Arable land (ha) | 25.5 (2.2 – 92.0) |
| Herd size (LU) | 12.8 (2.2 – 28.6) |
| Fodder area (ha) | 4.0 (0 – 14.0) |
| Cereal area (ha) | 14.3 (2.0 – 56.0) |
| Legumes (ha) | 3.1 (0 – 30.0) |
| Trees (ha) | 0.2 (0 – 3.0) |

A wide diversity of farms… A sample aimed to represent the whole region

Cereals: almost 50% of the arable land – a crucial role in Morocco

Herds mainly made of cattle. Sheep and goats with reduced weight

# Results

## Work group in the farms

### Persons within the family cell

| Number of persons | Number of farms |
|---|---|
| 0 | 1 |
| 1 | 1 |
| 2 | 5 |
| 3 | 1 |
| 4 | 4 |
| 5 | 1 |
| 10 | 1 |

### Off-farm workers

More often (13 of the 14 farms): workers associated to seasonal tasks

# Results

## Work within the study sample

### Daily routine work associated to the herd

| | Mean ± standard deviation | Minimum | Maximum |
|---|---|---|---|
| Annual daily routine work (h) | | | |
| - Total | 4,650 ± 1,964 | 1,849 | 8,683 |
| - Per LU | 485 ± 273 | 123 | 909 |
| - Per ton of milk delivered | 597 ± 558 | 25 | 1,681 |

### Routine work devoted to the herds' distribution throughout the year

**Period of intense work** (April to August)

**Period of less activities** (September to March)

**Family members: 78% of routine work devoted to herds**

# Results

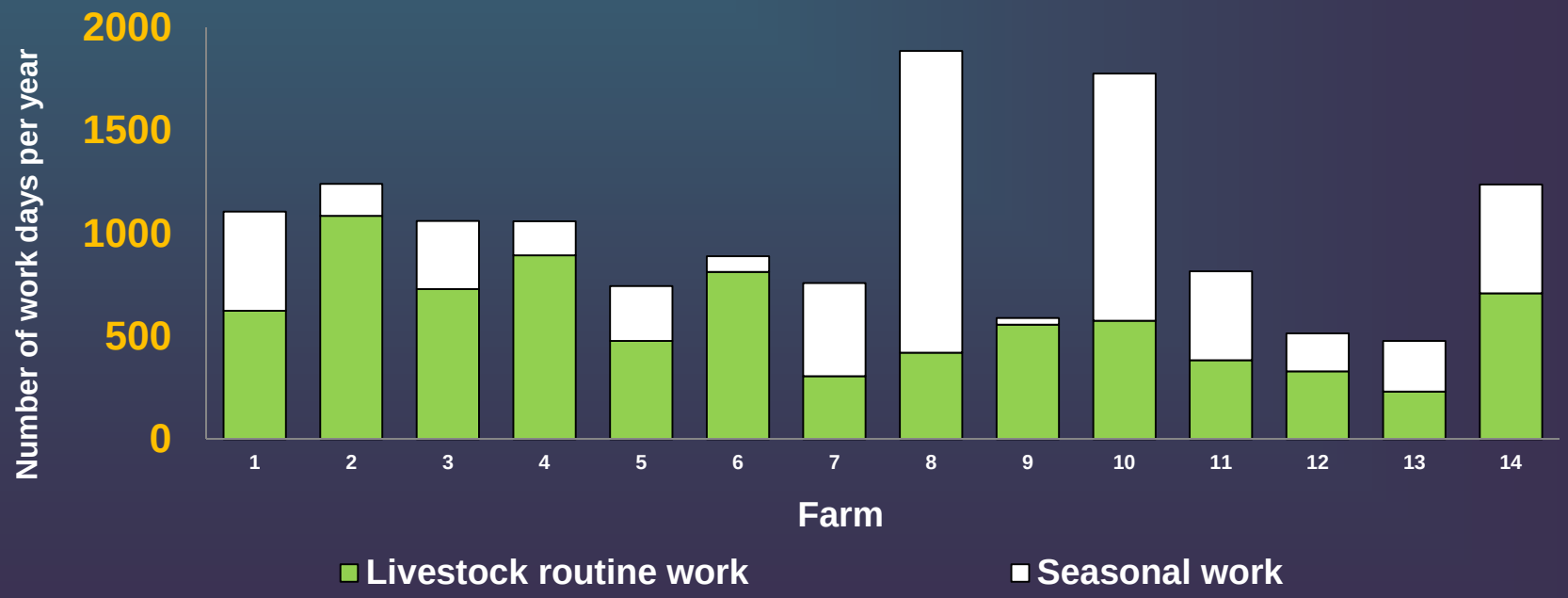
## Assessing work volumes in farms

**Total work : Daily routine work (herd) + seasonal work (crops)**

**TW = 1,030 equivalent days/year**

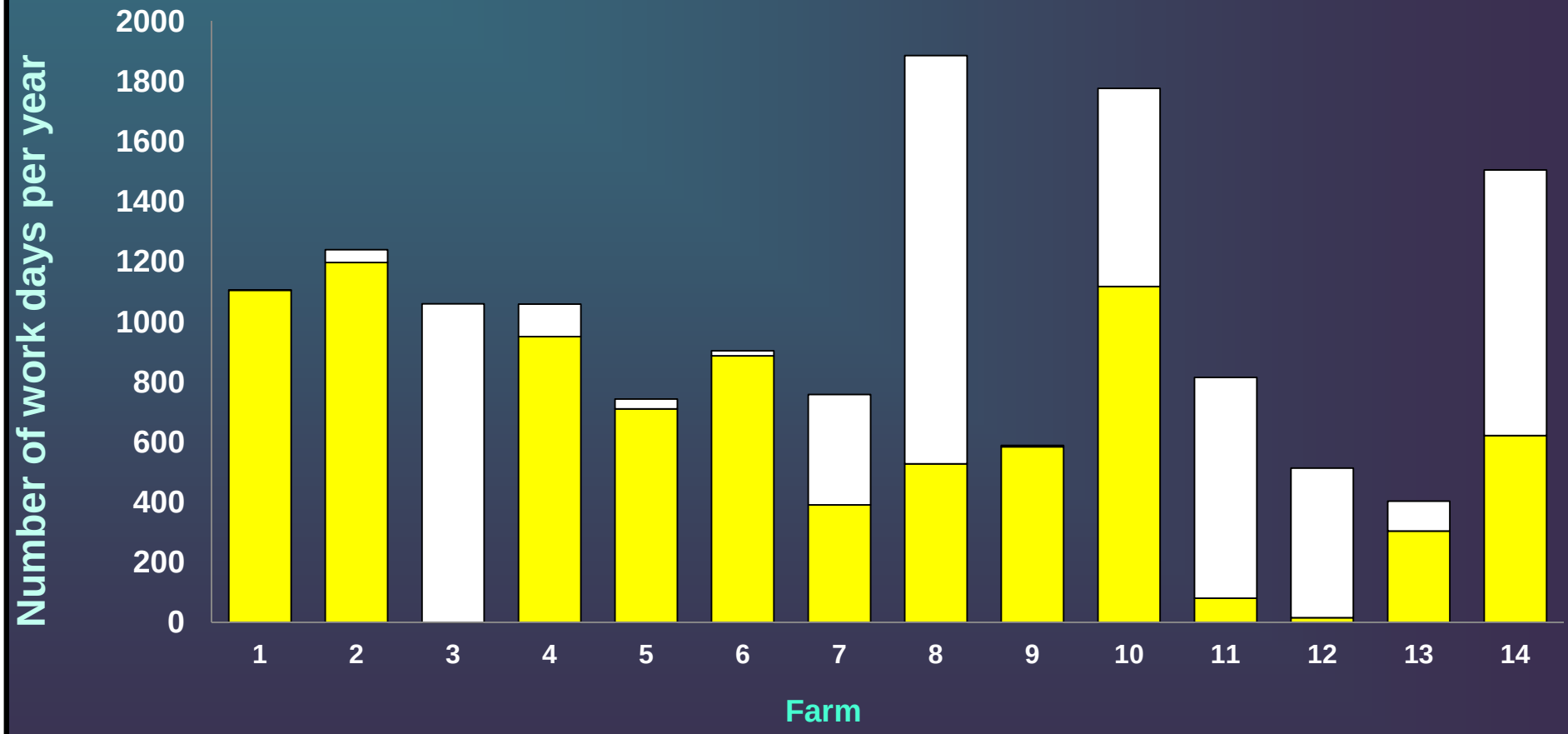
**SW = 449 equivalent days/year**

**DRW = 581 equivalent days/year**



# Results

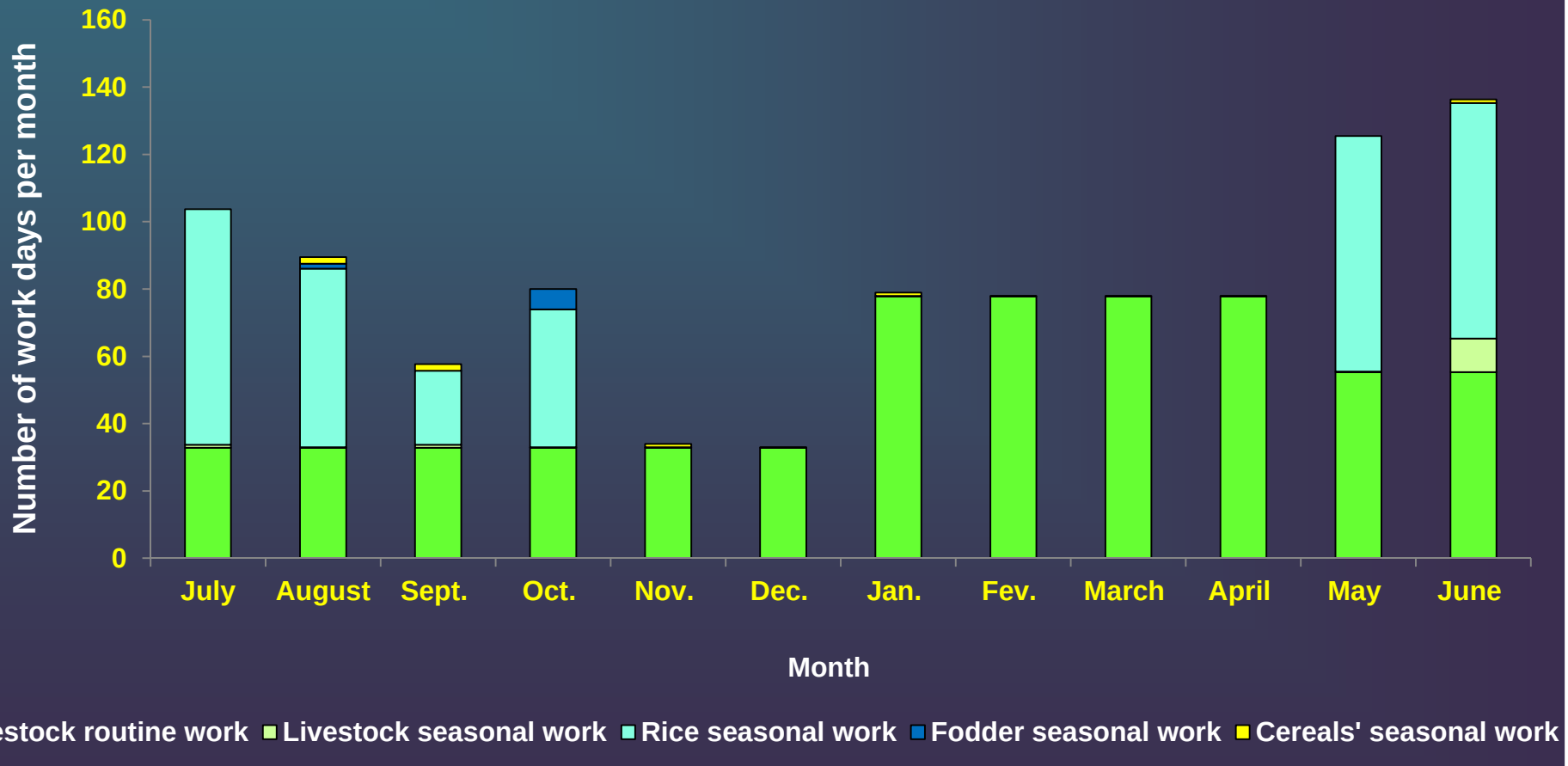
## Share of the total work between family members and off farm workers



# Results

## Two work management strategies in relation to farming systems

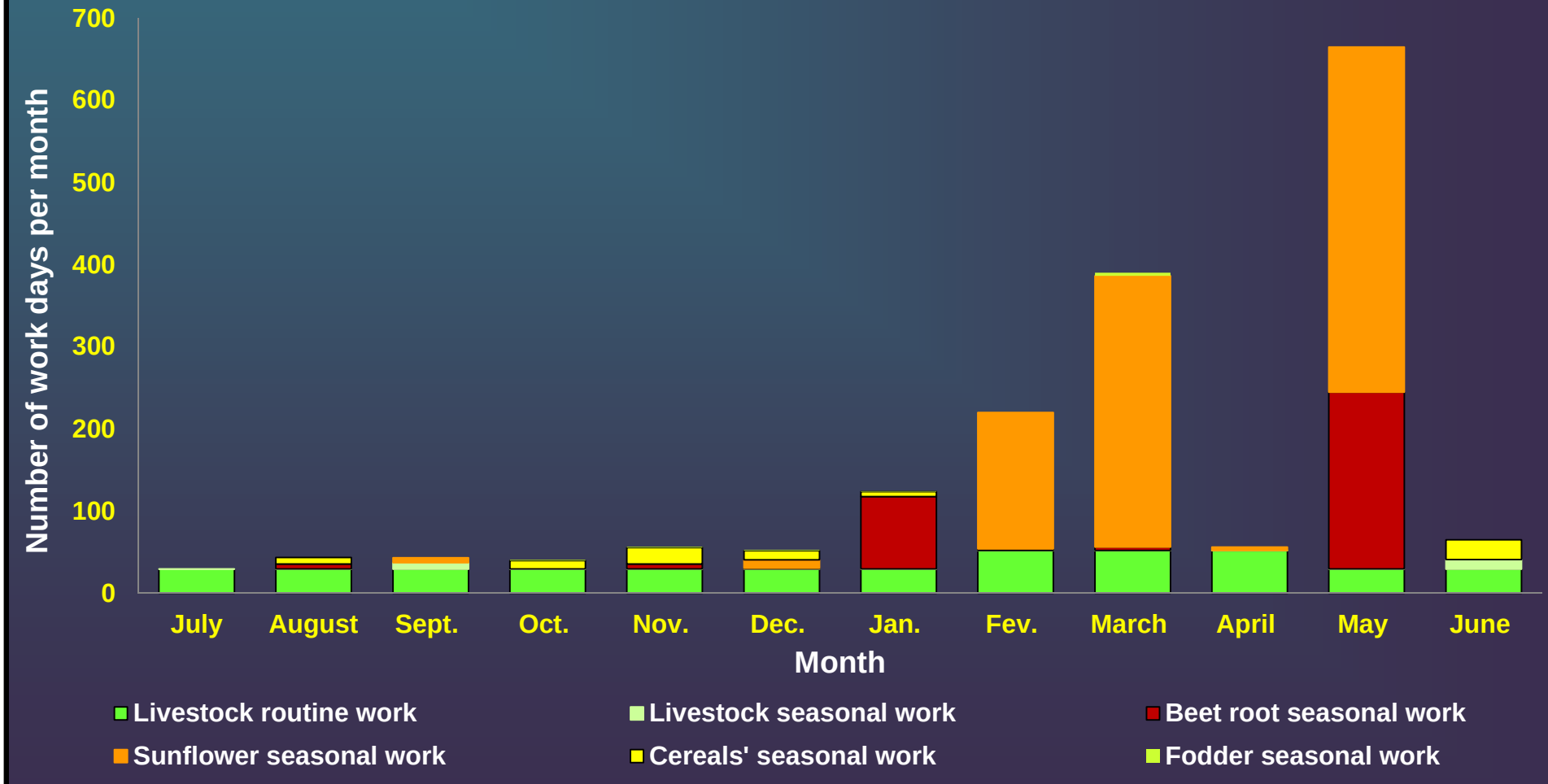
### 1. Mainly livestock and fodder crops/cereals



# Results

## Two work management strategies in relation to farming systems

### 2. Livestock and horticultural crops



# Results

## Economic efficiency of work: gross incomes generated by a day of work

**Total Work: 353 DH/day (32 Euros)**

**Daily routine work: 24 DH/day (2.2 Euros)**

**Seasonal work (crops): 1,114 DH (101 Euros)**

# Results

**Typology of farms with regard to agricultural constraints and related work management**

1. **Farms mainly involved in livestock production**

2. **Farms with a marked horticultural orientation**

3. **Typical mixed crop/livestock farms**

# Results

## Typology of farms with regard to work management

| | Livestock | Horticulture | Mixed Crop/Livestock |
|---|---|---|---|
| Arable land (ha) | 9 ± 7 | 28 ± 33 | 43 ± 40 |
| Livestock Units | 11 ± 4 | 8 ± 5 | 16 ± 10 |
| Fodder area/Total land (%) | 46 ± 38 | 11 ± 4 | 10 ± 13 |
| Family members involved in work | 3 ± 0,9 | 3 ± 2 | 3 ± 4 |
| Routine work (days) | 673 ± 280 | 491 ± 78 | 524 ± 229 |
| Seasonal work on crops (days) | 136 ± 163 | 930 ± 627 | 271 ± 125 |
| Work autonomy (%) | 74 ± 33 | 62 ± 34 | 44 ± 44 |
| Income generated per LU (€) | 1,005 ± 362 | 541 ± 121 | 501 ± 336 |
| Income per ha of crops (DH) | 559 ± 443 | 1,061 ± 105 | 1,067 ± 693 |

# Conclusion

- Work in farming systems: a growing constraint

- Livestock work: mainly associated to family members/Limited payment

- Work in cash crops: more related to off-farm workforce

- Daily routine work: hard and generating a limited income. But necessary due to its "non economic" roles: manure, diversification of income sources, coping with hazards, etc.

- More research needed to assess precisely work constraints in agricultural systems

# Thanks for your attention