Agroecological transition may reduce the fat content of Fourme de Montbrison cheese

M. COPPA[1], V. Breton[2], M. Chabrut[2], A Passel[2] and B. Martin[3]

[1]Department of Agricultural, Forest and Food Sciences, University of Turin, Italy

[2] Syndicat de la Fourme de Montbrison AOP, France

[3]Université Clermont Auvergne, INRAE, VetAgro Sup, UMR Herbivores, France

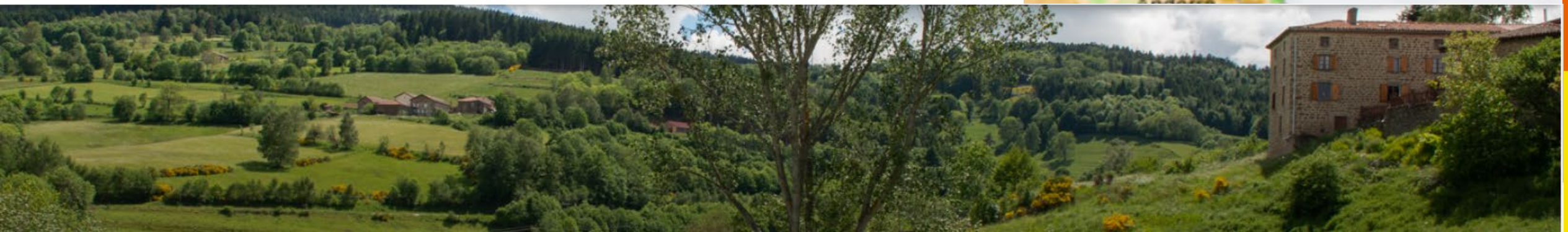
PDO *Fourme de Montbrison*

- Blue type cheese made with pasteurised or raw (38%) milk
- 58 farmers
- 7 dairies
- 690 tons/year

Massif Central
(500-1200 m a.s.l.)

PDO specification:

- 52% min fat/DM (very high!)



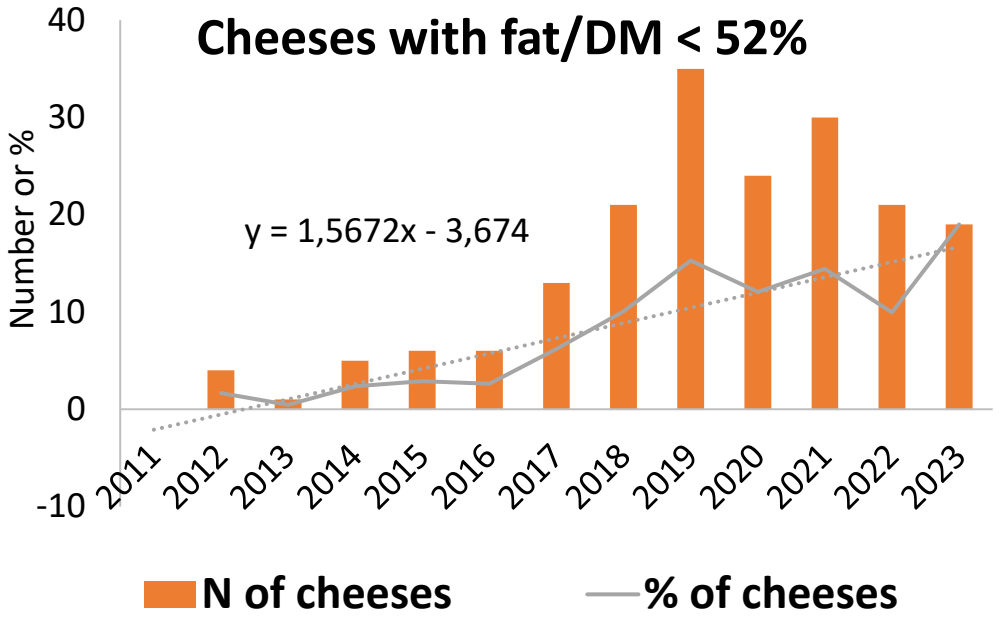
Fourme de Montbrison » PDO system

- Historically based on **Holstein** breed and **maize silage** as forage base
- **Agroecological transition** ongoing since 2011 (national demand):

  - maximisation of **grazing**

  - shift from Holstein to **Montbélierde** breed (Ho form 56% in '90 to 26% in 2023)

Problem:



→ Decrease of cheese fat/DM content; since 2018 > 10% of non conformities, mainly during the grazing season

AIM

1 – Fat/DM is mainly function of milk fat to protein ratio (PFR)

→ Identify farming practices at the origin of the low milk FPR

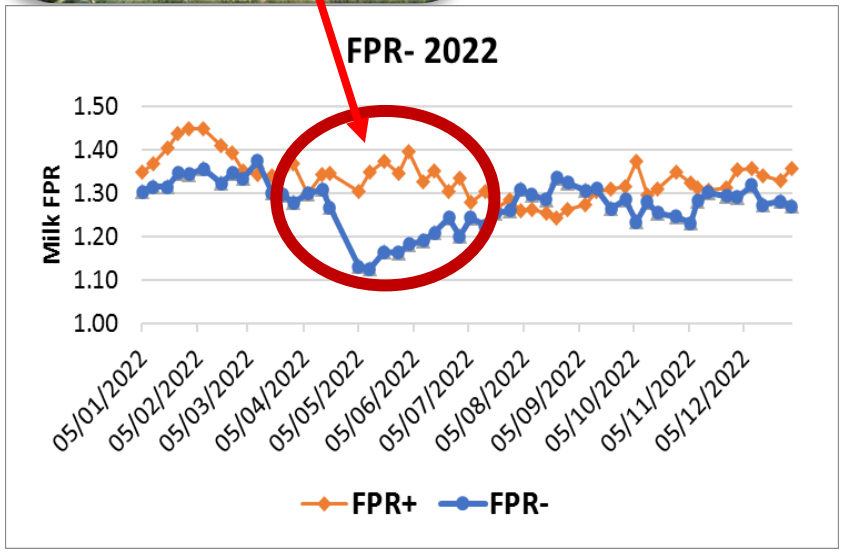
2 – Test possible solutions to increase fat/DM cheese content

→ Living lab approach

THIS PROJECT HAS RECEIVED FUNDING FROM **THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT Nº 101000250

Materials and Methods

Experimental design



Farm FPR Profiling

1 – collection and analysis of the FPR of bulk milk of all the farm associated to PDO Fourme de Montbrison

2 – Identification of **20 farms** ⇄ With **low FPR** during grazing **(FPR-)**

With **high FPR** all year round **(FPR+)**

3 – **Milk and herbage sampling** at the beginning of the grazing season (P1) and 1.5 months later (P2)

4 – **Milk** composition (fat, protein, urea, etc) and **herbage** nutritive value **analysis**

5 – **Survey** on global farming practices + **detailed practices** in P1 and P2 (grazing in particular)

Results

Global farming practices
(Anova)

Small differences in feeding systems:

More humid forages in FPR+

→ faster transition to pasture

Item	FPR-	FPR+	SEM	Significance
Winter cow diet (% diet DM)				
Grass silage	17	**41**	23.3	*
Maize silage	2	**12**	9.8	*
Summer cow diet (%diet DM)				
Grass silage	0	**12**	2.8	*
Hay	11	3	1.8	*
Grazing transition speed				
N of 1/2 day grazing before full grazing	**10**	5	6.5	†
Duration of a grazing cycle (day)	**19**	26	7.9	†

Shorter grazing cycles in FPR- → **more intensive rotational grazing??**

Results

Sampling days farming practices
(Mixed model: group fixed, period repeated, interaction)

Item	FPR-	FPR+	SEM	Significance	
				FPR group	Period
Pasture caractheristics					
Milk Forage Units (N)	0.94	0.89	0.012	**	ns
OMd (%)	**75.3**	**71.9**	0.86	**	ns
ADF (g/kg DM)	**256**	**277**	7.1	*	ns
CP (g/kg DM)	**200**	**174**	7.3	*	†
Milk composition					
Fat (g/kg)	**39.4**	**42.0**	0.461	***	*
Protein (g/kg)	33.5	32.8	0.309	†	*
FPR	**1.18**	**1.28**	0.017	***	ns
Urea (g/L)	308	276	12.95	†	†

FPR-: higher OMd, CP, MFU and lower ADF

→ **pasture grazed at an earlier phenology,**

Confirmation of **intensive rotational grazing**

FPR-: **less fiber → less fat in milk → lower FPR**

Results

Sampling days farming practices

Significant Pearson's correlation	Milk fat	Milk protein	FPR
Pasture caractheristics			
Milk Forage Units (N)	-0.38		**-0.40**
OMd (%)	-0.42		**-0.38**
ADF (g/kg DM)	0.40		**0.40**
Bypass Protein (g/kg DM)		0.38	**-0.35**
Proportion of Holstein breed (%)		-0.57	**0.33**

Pasture grazed at an **early phenology** **negatively correlated to** milk **FPR**

Holstein Breed **positively correlated to** milk **FPR**

Living Lab

Origin of the problem:

Intensive and early rotational gazing → lack of fiber in cow diet → less VFA in the rumen →Lower fat synthesis

Discussion with farmers:

- 8 farmers with and without FPR problem + PDO association managers

Possible solution		Application contraint
1	Late/extensive grazing	Loss of milk yield (€)
2	Hay integration at pasture	Too small and fragmented plots: need to move continuously the trough
3	**Change concentrate type rapid → slowly degradable starch** **(maize flour vs corn cob silage)**	NONE: Tested solution

VS

Living Lab

Test:

- **4 FPR- farms changing** form maize flour to corn cob silage **vs 4 FPR- farms keeping** maize flour
- **Milk** composition (fat, protein, urea, etc.) and **herbage** nutritive value **analysis**

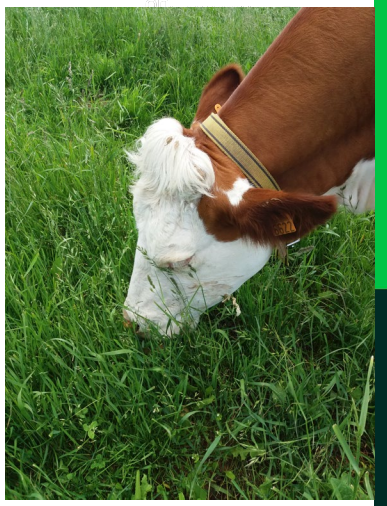
  at the beginning of the grazing season (P1) and 1 months later (P2)
- **Survey of detailed farming practices**

Results:

(Mixed model: group fixed, period repeated, interaction)

- **No differences in farming practices, milk or herbage composition between FPR- flour vs FPR- cob silage farms**

Conclusion



Agroecological transition:

- maximisation of **grazing and** shift from Holstein to **Montbélierde** breed

- **Intensive rotational grazing to keep milk yield**

- **Lack of fiber** at the beginning of grazing season → **less milk fat** and **low FPR**

- High frequency of **cheeses with Fat/DM < 52% in spring**

Solution ??

- **Late/extensive grazing** → **Loss of milk production**

- **Modification of PDO cheese specifications (lower Fat/DM)**

intaqt one quality

Thank you for your attention

mauro.coppa@unito.it

THIS PROJECT HAS RECEIVED FUNDING FROM **THE EUROPEAN UNION'S HORIZON 2020 RESEARCH AND INNOVATION PROGRAMME** UNDER GRANT AGREEMENT Nº 101000250

Project Coordinator: **Bruno Martin - INRAE**
E-mail: bruno.martin@inrae.fr

Project Co-coordinator: **Cécile Berri - INRAE**
E-mail: cecile.berri@inrae.fr

Communication Officer: **Dina Lopes - CONSULAI**
E-mail: dlopes@consulai.com

www.intaqt.eu

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DISAFA Università degli studi di Torino

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Fourme de Montbrison Monts du Forez Appellation d'origine protégée