Alfalfa to get back into planetary boundaries

Different trajectories for dehydrated alfalfa in Europe for livestock farming

Yann MARTINET

Practical workshop session 2

FROM 03 TO 06 nov. 2025

2025 world alfalfa congress
FRANCE REIMS-CHÂLONS

Alfalfa to get back into planetary boundaries

2025 world alfalfa congress
FRANCE REIMS - CHÂLONS

Production tailored as closely as possible to the changing needs of animal sectors

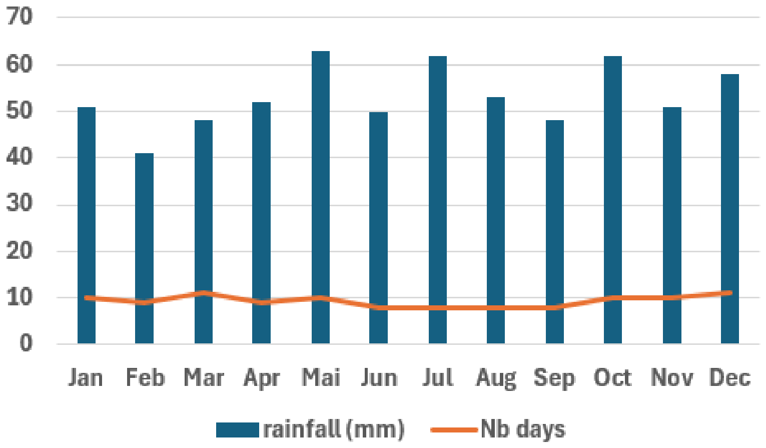
Didier COULMIER

Désialis

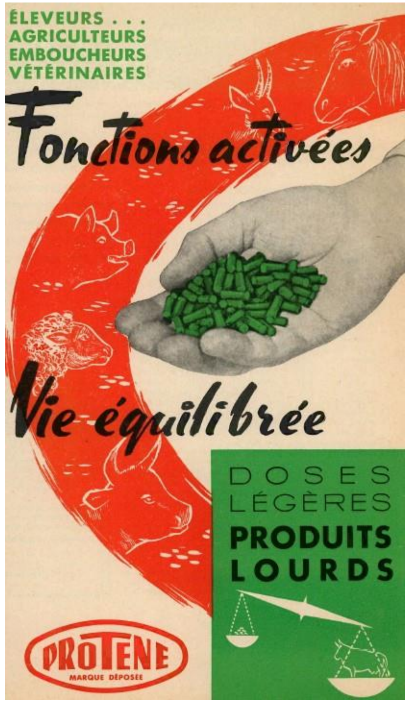
FROM 03 TO 06 nov. 2025

First steps in 50's

- First factories in Normandy
  - ➢ secure hay production for ruminants
- Alfalfa meal used by producers
- Pelletizing => start of resale to livestock
  - ➢ advertisement
- First trials with INRA on beef



Paris 1958-2001



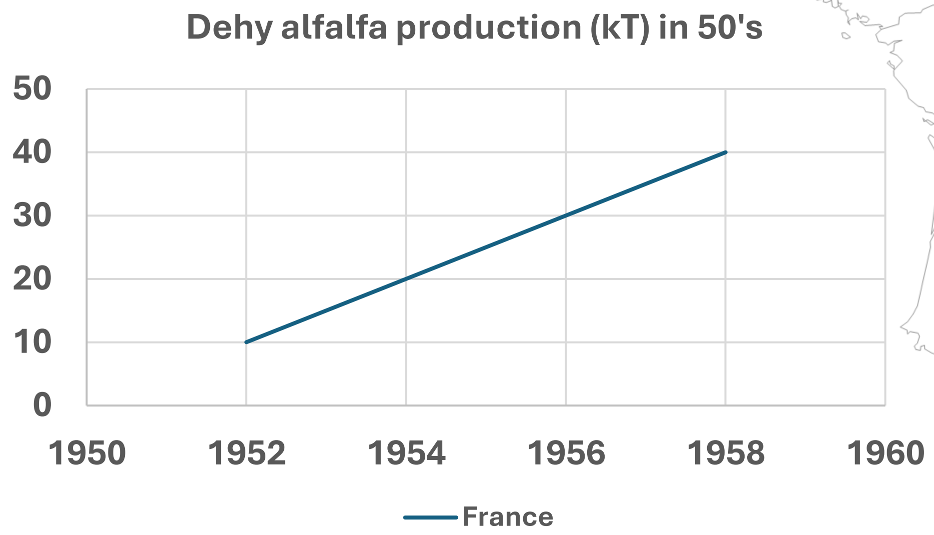
Alfalfa to get back into planetary boundaries

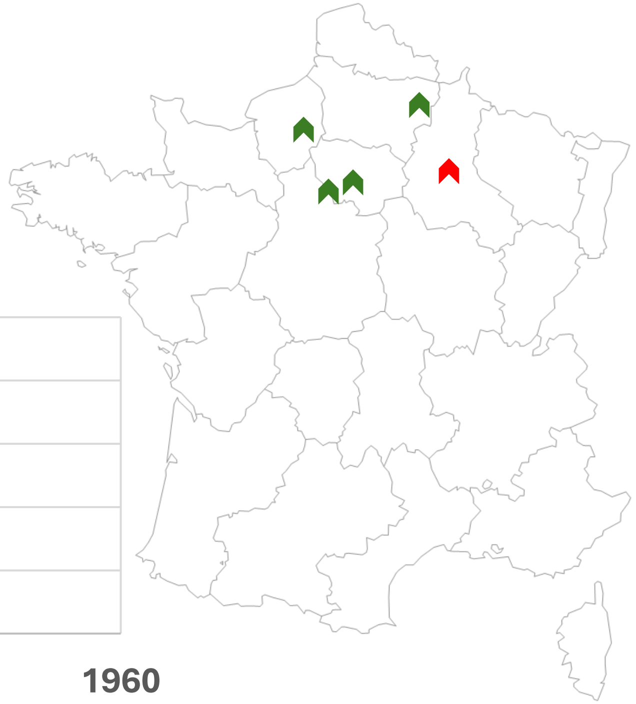
2025 world alfalfa congress FRANCE REIMS · CHÂLONS

First steps in 50's

- Large parts of land cleared in Champagne
  - ➢Increase of crops
  - ➢Decrease of husbandry (cows, sheep)
- 1959 : first plant in Champagne

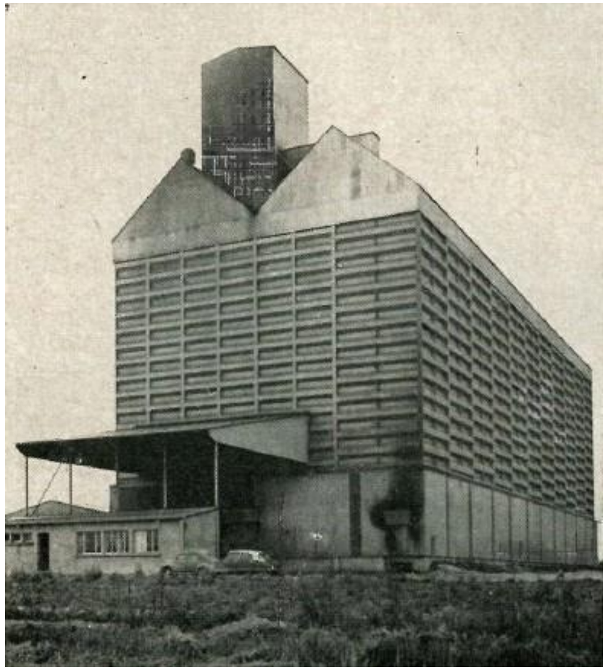
Fattening of Salers steers fed on alfalfa/beet basis *(Béranger 1968)*		
	Alfalfa hay	**Dehy Alfalfa**
Intake (kg DM/100 kg LW)	**1.95**	**2.08**
ADG (kg/d)	**0.96**	**1.18**
FCR (kg/kg)	**8.27**	**7.24**

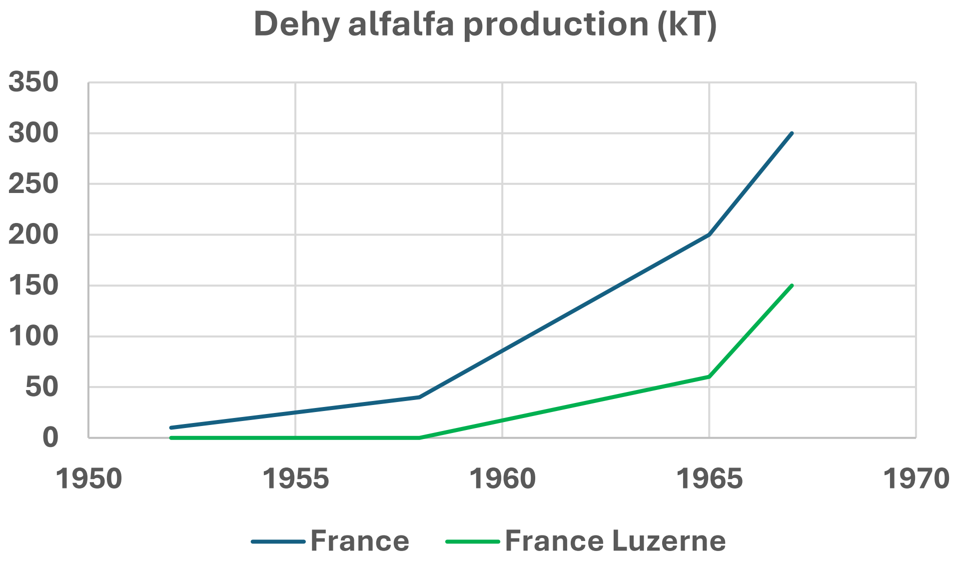




Production development in 60's

- Producers organisation = coops
- Synergy with sugar beet industry
- Etablishing France Luzerne
  - 3 new plants and 1 storage in Champagne
  - common sales
  - quality control
- Production increase
- Start of exportation



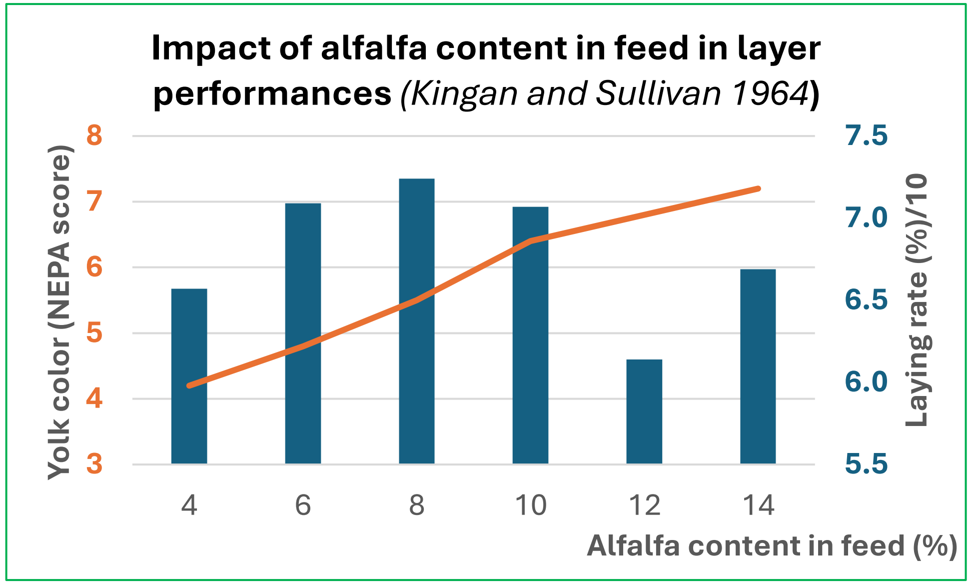


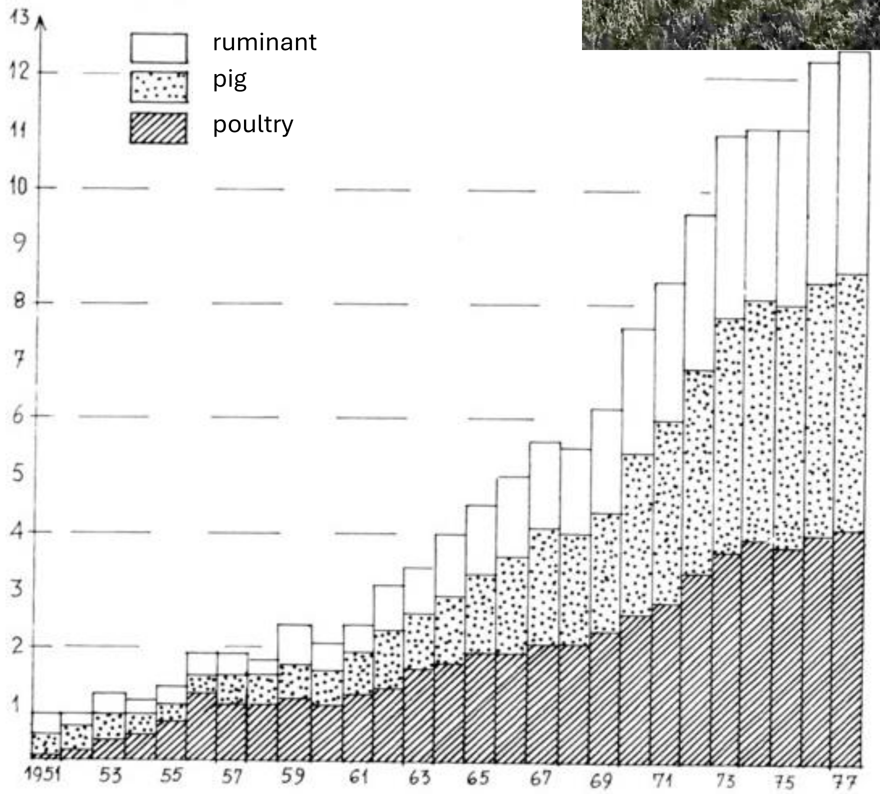
Impact of quality in fattening steers fed on dehy alfalfa/dehy sugar beet pulp basis ***(Béranger & Demarquilly 1968)***

	18% CP	14% CP
Intake (kg/100 kf LW)	2.27	2.29
ADG (kg/d)	1.065	0.988
FCR (kg/kg)	9.18	10.15

Production development in 60's

- Development following feed compounder industry
- 40% production exported (1965) – Germany
- Mainly Layers market for yolk pigmentation



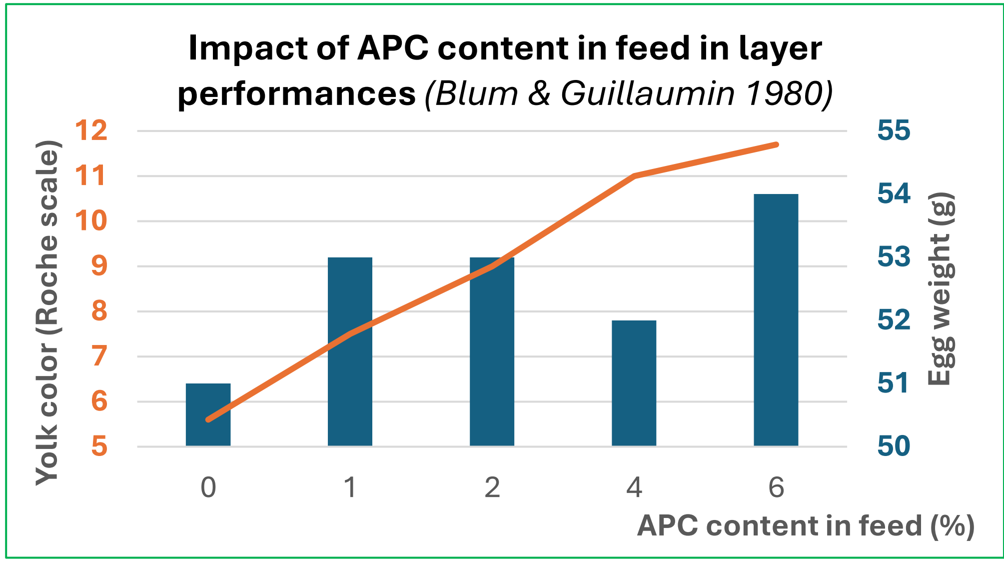


Production development in 60's

- Market and production organisation driven by carotene
  - ➢ quality control on moisture, protein and carotene
  - ➢ storage in airtight bins
  - ➢ products segmentation with garanty

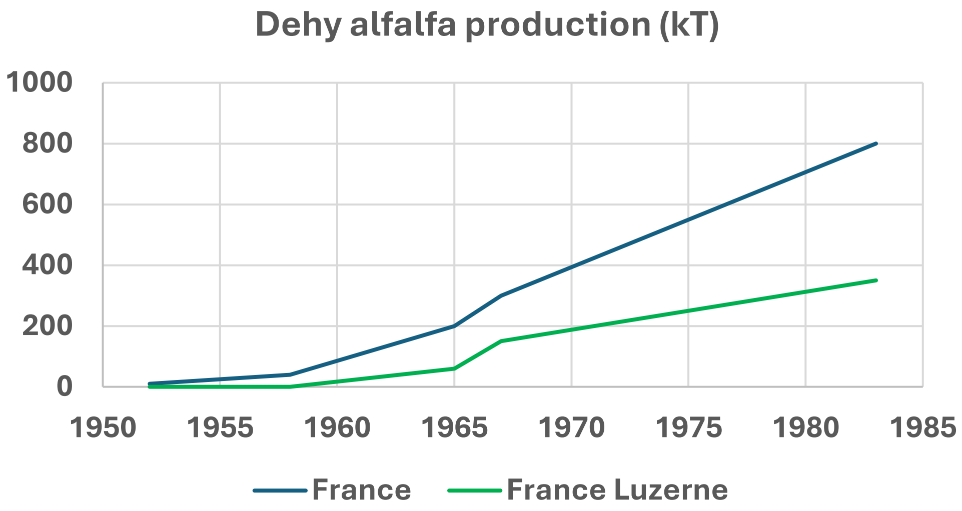
Development during oil crisis years in 70's

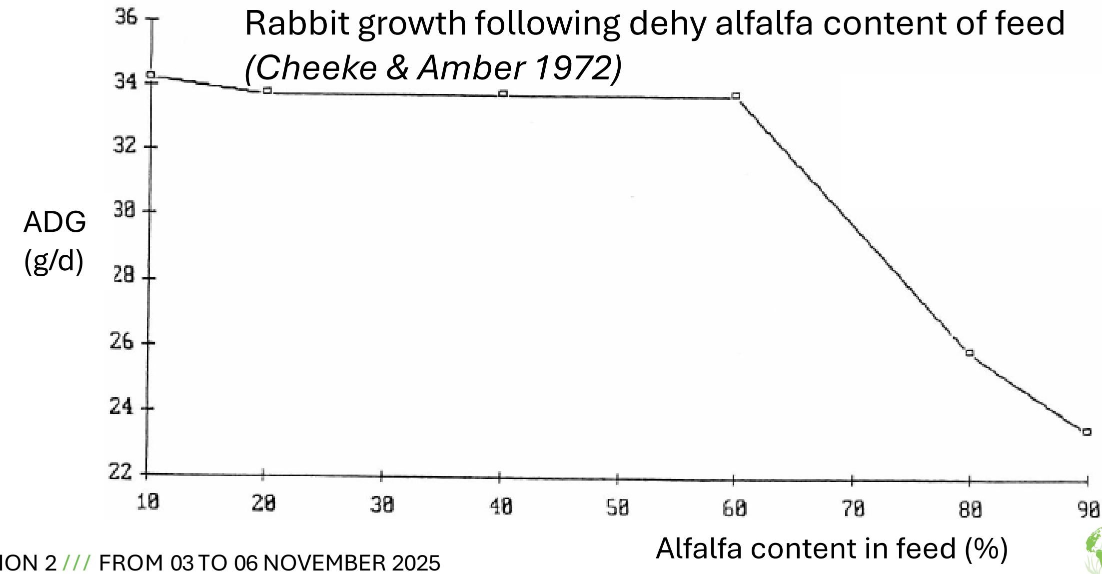
- Continued expansion at 20%/year
- Improvement at field (breeding, harvest)
- Protein extraction
  - ➢ first trials in 1970 from Kohler and Bickoff works
  - ➢ first plant in 1976
  - ➢ extraction of protein and carotenoids (APC)
- World oil crisis in 1975 : energy cost x 2.7
  - ➢ ➘ production 30 – 60% in Europe and US
    - ➢only 15% in France
  - ➢ energy savings
    - ➢ pre-wilting in swath, recycling…
- European subsides to dehy products in 1978



New development pathways explored in 80's

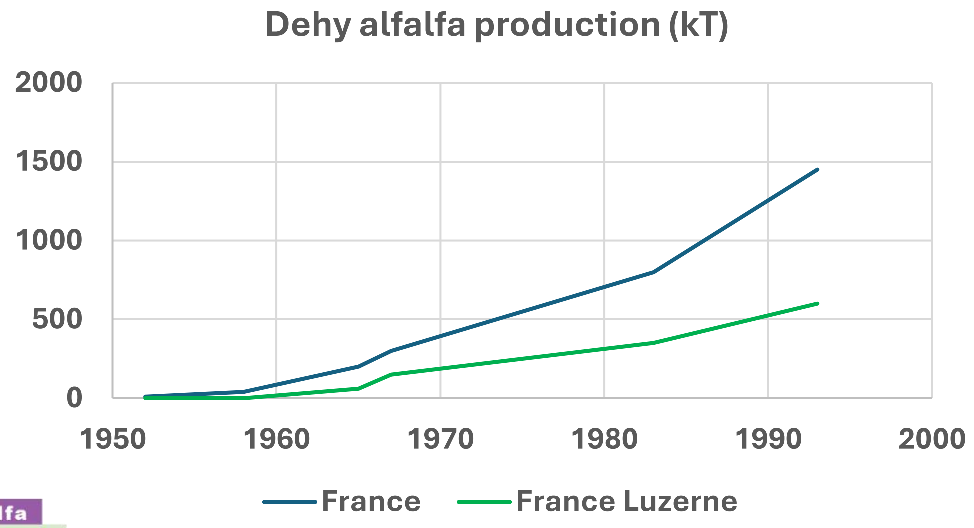
- Adaptation to energy crisis : energy source diversification (coal, gaz, electricity, straw…)
- Production still growing with Champagne domination
- New products/markets : rabbit feed, bales, SW France
    - ➢ fiber becomes a quality criteria





Consolidation in 90’s

- Production growth with new storages
- Improvement of characterization
  - ➢ new alfalfa products in INRA table
  - ➢ NDF/ADF, digestibility
  - ➢ NIR
- First bale production line in Champagne



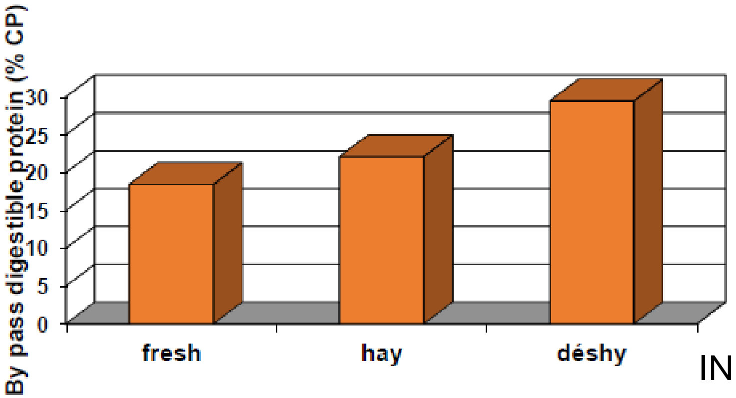
Consolidation in 90's

- Marketing (product segmentation, communication)
- Physical vs. chemical fiber for herbivorous
  - ➢ effective/physical fiber requirement (ruminants)

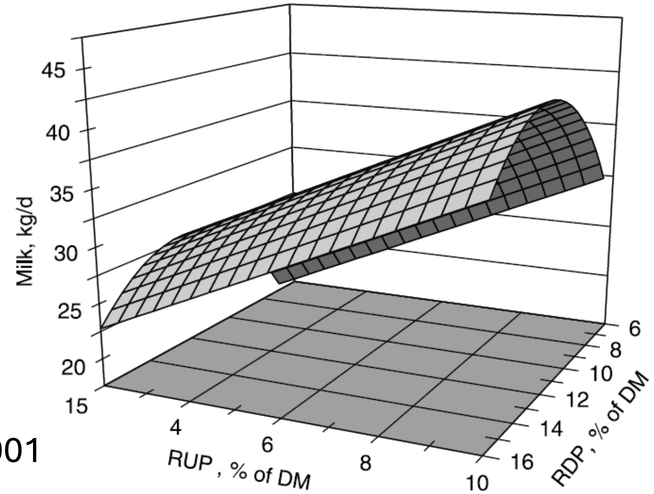
	(long) hay	chopped	ground
Intake	21,3 kgMS	22,6 kgMS	24,8 kgMS
Intake+rumination duration	597 mn	518 mn	445 mn
Rumen pH	6,6	6,6	6,1
Milk	30,3 kg	30,9 kg	31,4 kg
Fat	32,1 ‰	31,5 ‰	28,8 ‰
Protein	35,7 ‰	36,1 ‰	37,6 ‰

Impact of size of alfalfa particles on milk production *(Telmour Yansarl et al. 2004)*

- By pass protein (RUP)



INRA 1998

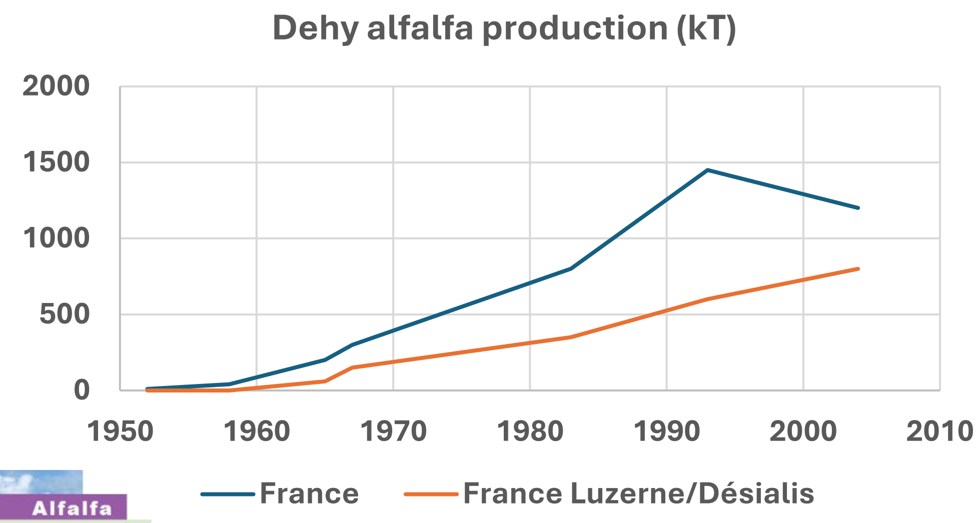


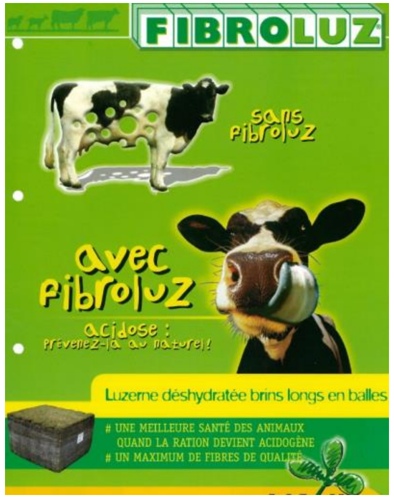
NRC 2001

End of (direct) European subsides in 2000's

	Before 1995	1995-2004	After 2004
EU subsides	≈ 100 €/t	68 €/t	33 €/t

- New economic balance to establish
- Costs cut
  - ➢ energy => lowering carotene and protein in alfalfa products
  - ➢ companies' mergers (France Luzerne/Luzerne de Champagne)
- Development of products range
- FRALUPRO project





	1960	1968	1981	2003
Nb of products	2	4	8	23

End of (direct) European subsides in 2000's

- Development of bale market and start of new markets

Dehy alfalfa or straw to cure rumen rumen acidosis
(Peyraud & Delaby 2003)

	CONT	NCONT	LUC	STRAW
Dry matter intake (kg d^{-1})	17.7	21.4	22.3	20.8
Milk (kg d^{-1})	29.3	30.0	30.0	30.2
Fat content (g kg^{-1})	28.7	27.1	33.3	30.0
*Trans*10 C18:1 (% fatty acids)	2.5	3.8	1.6	2.0

Effectiveness of rapeseed with APC to enhance milk FA profile *(Dang Van et al. 2003)*

Table 6. Milk fatty acid yields of cows fed the 2 experimental diets

	Diet[2]	
Item[1]	EL	ER-APC
Transfer efficiency from diet to milk, % intake		
18:2 n-6	8.0	8.0
18:3 n-3	3.8	7.4

Effect of alfalfa solubles on ruminal digestion
(Peyraud & Coulmier 2004)

TABLE 1	CONTROL	TRIAL
Intake (kg DM/d)	22,0	23,2
OM rumen digestibility (%)	49,3	52,8
OM total tract digestibility (%)	70,9[a]	72,9[b]
NDF total digestibility (%)	57,2	59,2

- Increase of fossil energy cost and carbon dioxide emission issues
  - ➢ continue to reduce moisture of alfalfa supplying our plants

Adaptation to end of European subsides in 2010's

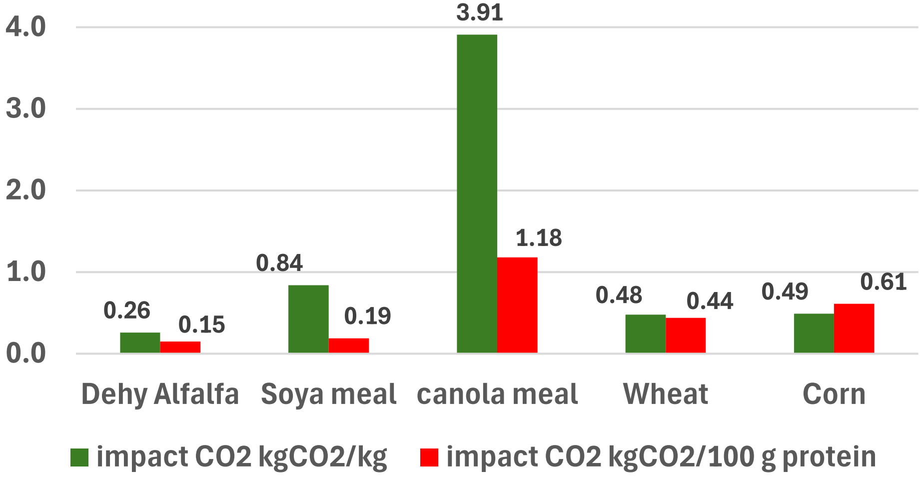
- Increase of DM alfalfa harvested (flat prewilting vs. swath)
  - ➢ energy savings (coal) and CO_2 mission reduction
  - ➢ decrease of carotene and xanthophyll content in dehy products
- EU plan for protein autonomy => protein plan subsides
- New range of products: organic
  - ➢ difficult in Champagne area => development in other areas
- Middle East new market
  - ➢ limited amounts

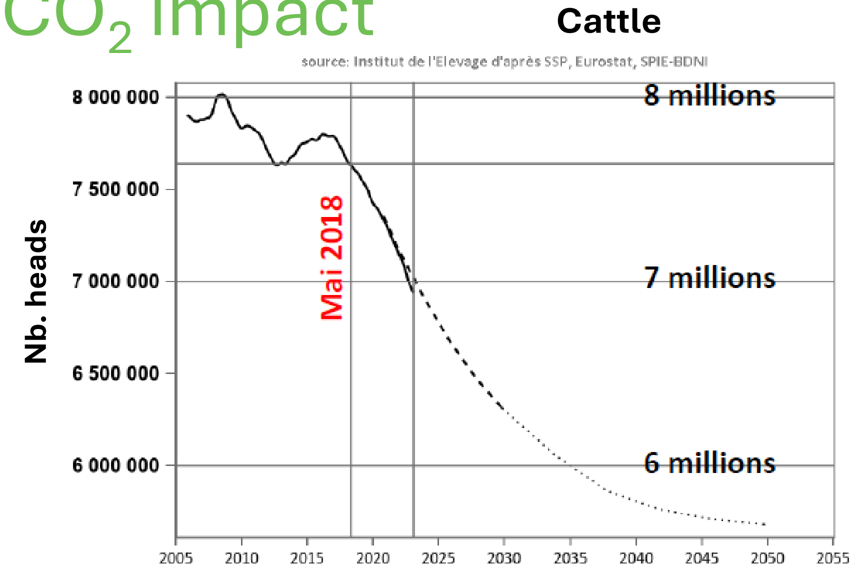
- Certification development (FCA, VLOG, private labels…)
  - ➢ access to markets

Creation of protein low carbon in 2020's

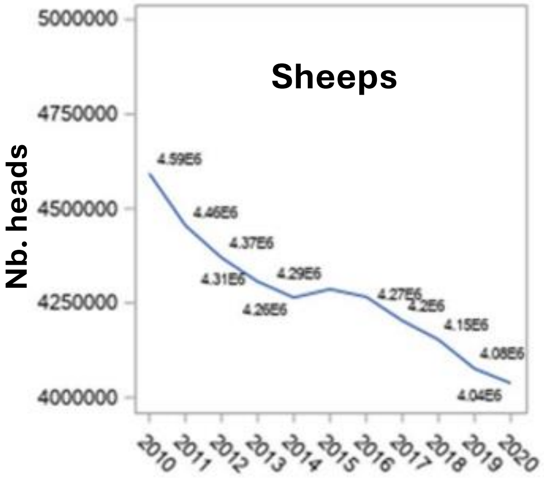
- Substitution of fossil energy by biomass => ➘ CO_2 impact

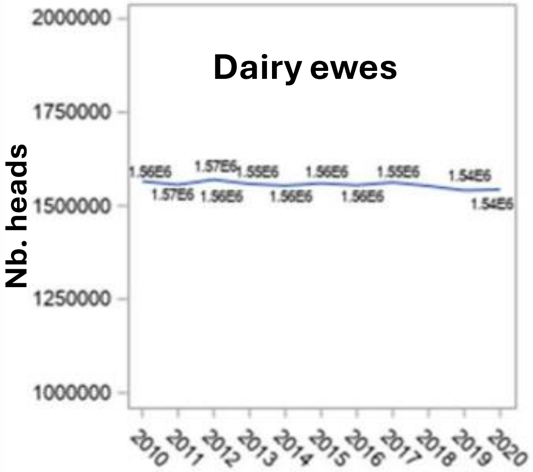
CO_2 values for raw material (EcoAlim v9 2024)





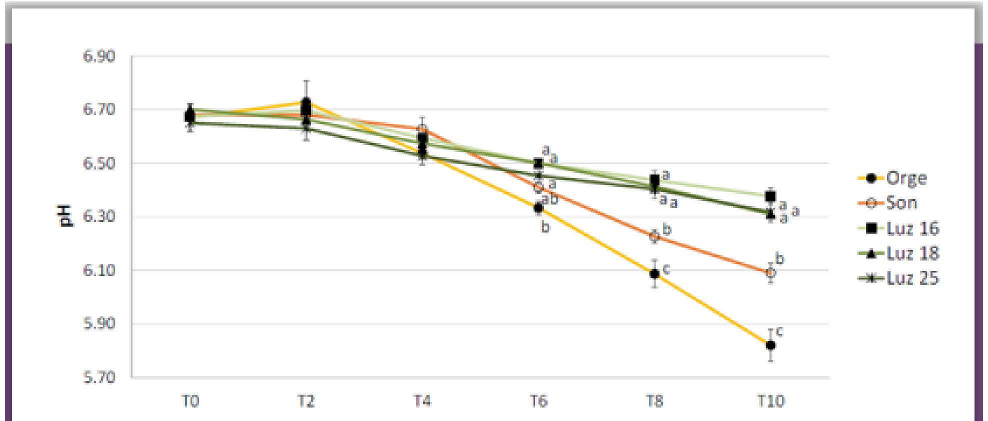
- Decrease of animal production
  - ➢ impact on market demands ?
  - ➢ new quality requirements ?





Creation of protein low carbon in 2020's

- Development of equine market
  - ➢ collaboration with research (Lab to Field)
  - ➢ increase of sales to feed compounders
  - ➢ new products

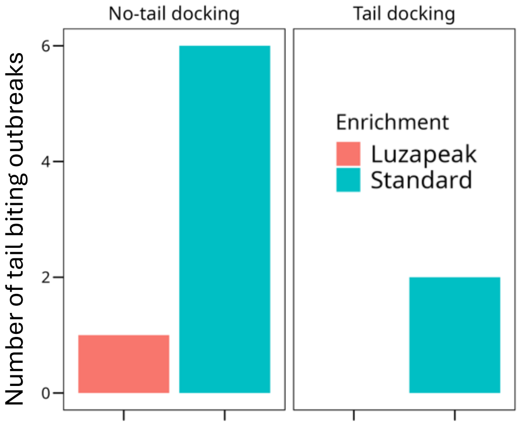


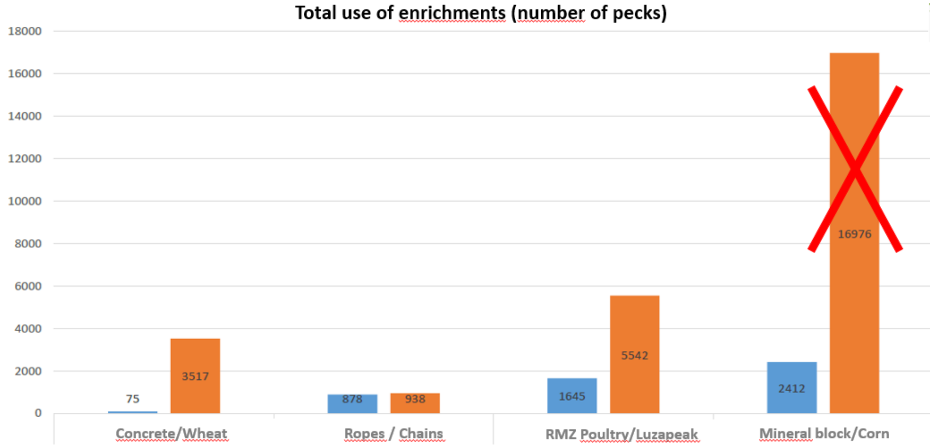
pH evolution with different 'alfalfa' products compared to barley and bran incubated in vitro with an equine gastric content inoculum

Grimm et al. 2019

- New market : Welfare
  - ➢ new consumers demand
  - ➢ Solution for poultry and pig

Poissonnet et al. 2024



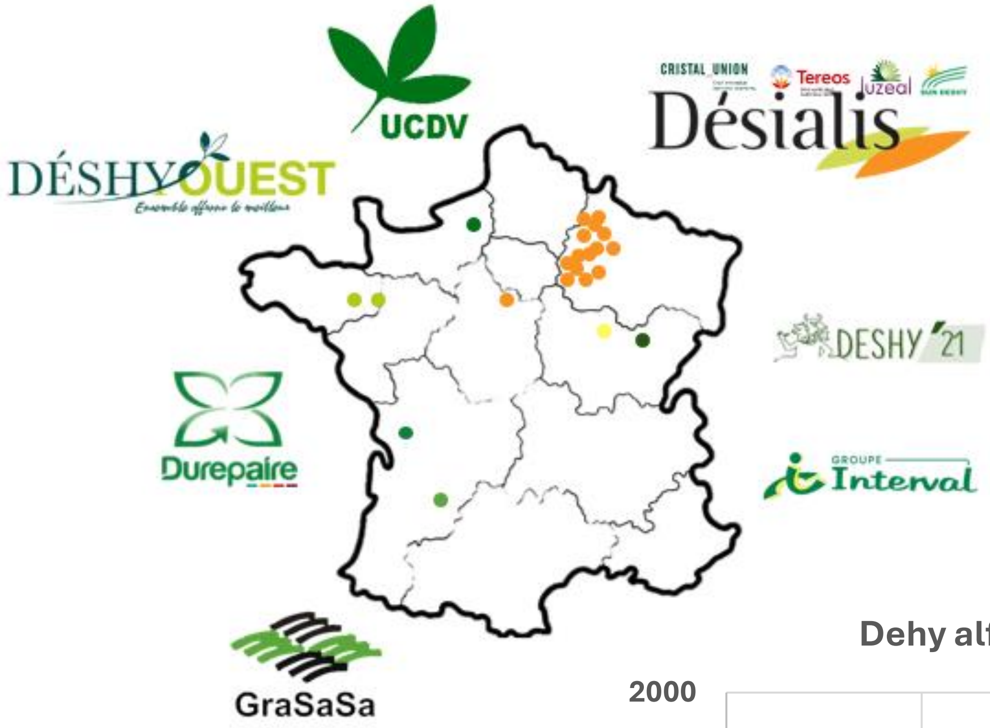


Mika et al. 2020

Alfalfa to get back into planetary boundaries

2025 world alfalfa congress FRANCE REIMS · CHÂLONS

Situation of French Dehy sector in 2020's



10 entreprises

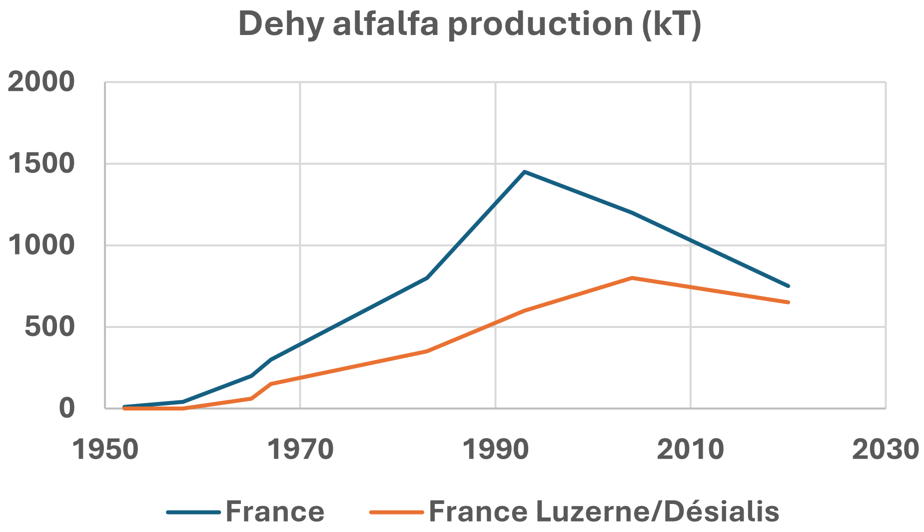
70 000 ha à destination de la déshydratation

6500 producteurs

25 Usines

750 000 tonnes (*60% balles, 40% granulés*)

1000 ETP directs



70 % : France
36 % : Feed compounders
34 % : Farmers
25 % : UE + CH
5 % : Over seas

73 % : Cattle
16 % : Horse
11 % : Rabbits

Energy vs. Quality

- Dehy vs. hay
  - No harvest loss
  - No carotene degradation
  - By pass effect
  - Visual presentation

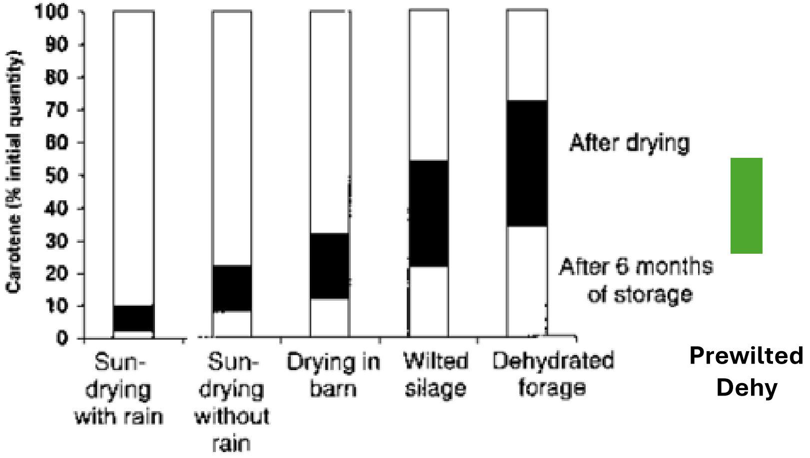
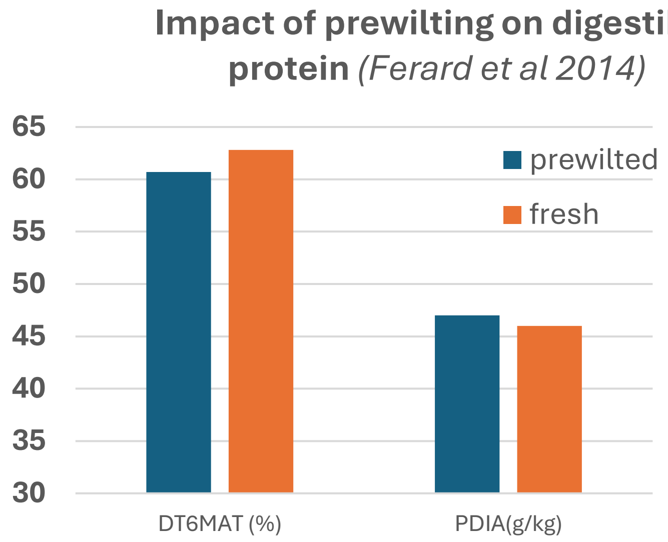


Fig. 19.2. Relative availability of carotene in comparison with its initial content in forages (from Wolter, 1988).

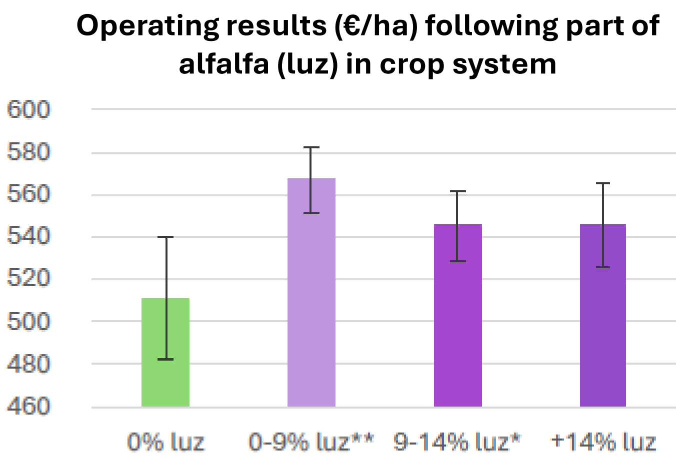
- Prewilting = return to hay ?
  - Stable by pass effect
  - Carotene loss=> loss of market interest



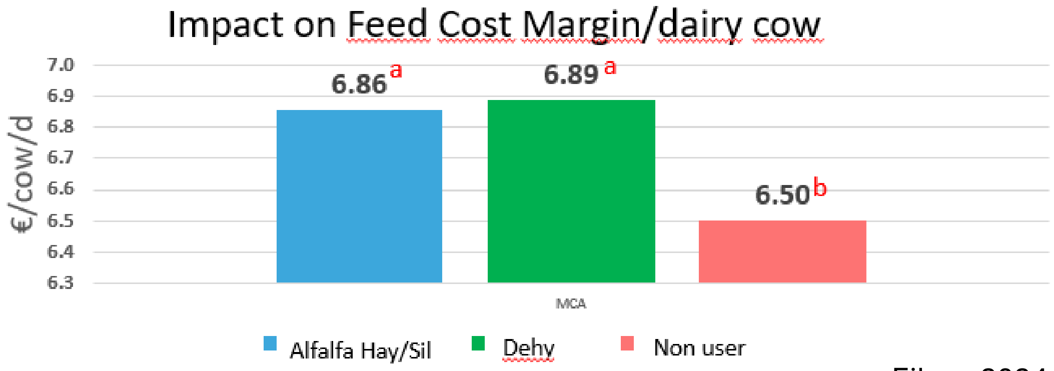
Alfalfa valorization

- At field
  - Fertilization, weed control, working load, equipment
  - Impact on the whole crop system => not easy
- Animal production
  - Well known improvement : intake, production, quality, health... with low impacts

Economic surveys



Poentis et al 2025



Eilyps 2024

Conclusion : Luzerne 2026

- Working group February 2020 – February 2021
  - ➢ inside and outside stakeholders
  - ➢ sector objectives and comitments

Environment	Animal Nutrition & Welfare	Socio-economic performance
Benefits in crop systems	Benefits on animal production	Preserve economic interest for farmers
IT development from field to plant outet	Inscrease segmentation of uses	⇨ *gender balance in governance*
$C0_2$ emission reduction	Develop horse market	
⇨ *reduction of 2/3 on 2012 basis*		