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Distillers Dried Grains with Solubles (DDGS) as protein feed to lactating dairy cows

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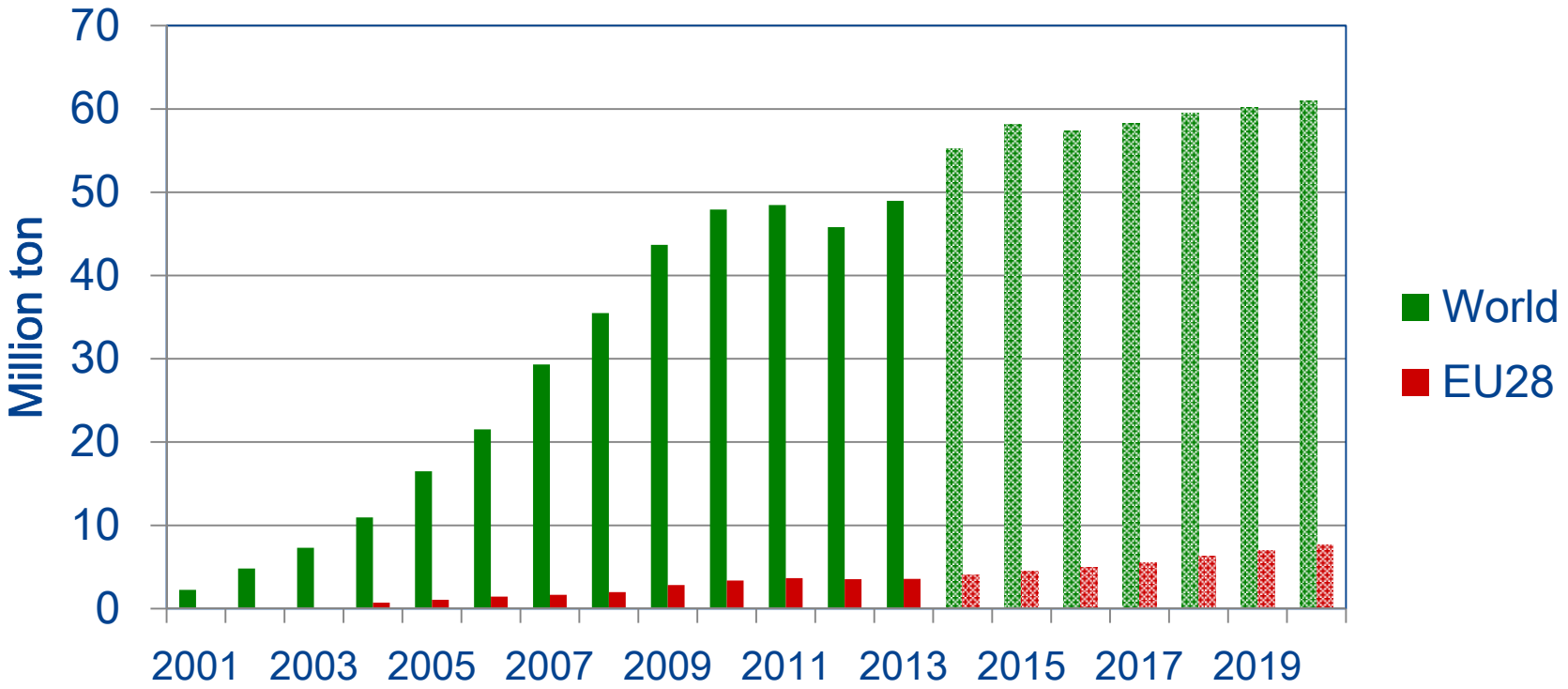
DDGS production 2001 → 2020



OECD-FAO Agricultural Outlook 2014-2023

Origin of DDGS

	Ethanol plants using		Grains, %
	Maize	Grains	
USA	186	9	< 5%
Canada	8	8	50%
EU	9	17	65%

Modified from Kalscheur et al. 2012

Grain DDGS as protein feed

	Grain DDGS	Rapeseed cake	Dehulled Soybean meal
Crude protein, %	34	33	53
• Amino acid N, %	73	79	85
Crude fat, %	7	12	2.4
NDF, %	25	27	10
NEL_{20}, MJ/kg DM	7.5	7.3	8.5

NorFor Feed Table, 2014

Grain DDGS
as protein feed for dairy cows

- Grain DDGS as substitute for soybean meal and rapeseed cake
  - ➢ Feed intake
  - ➢ Milk production
  - ➢ Milk quality (flavour)

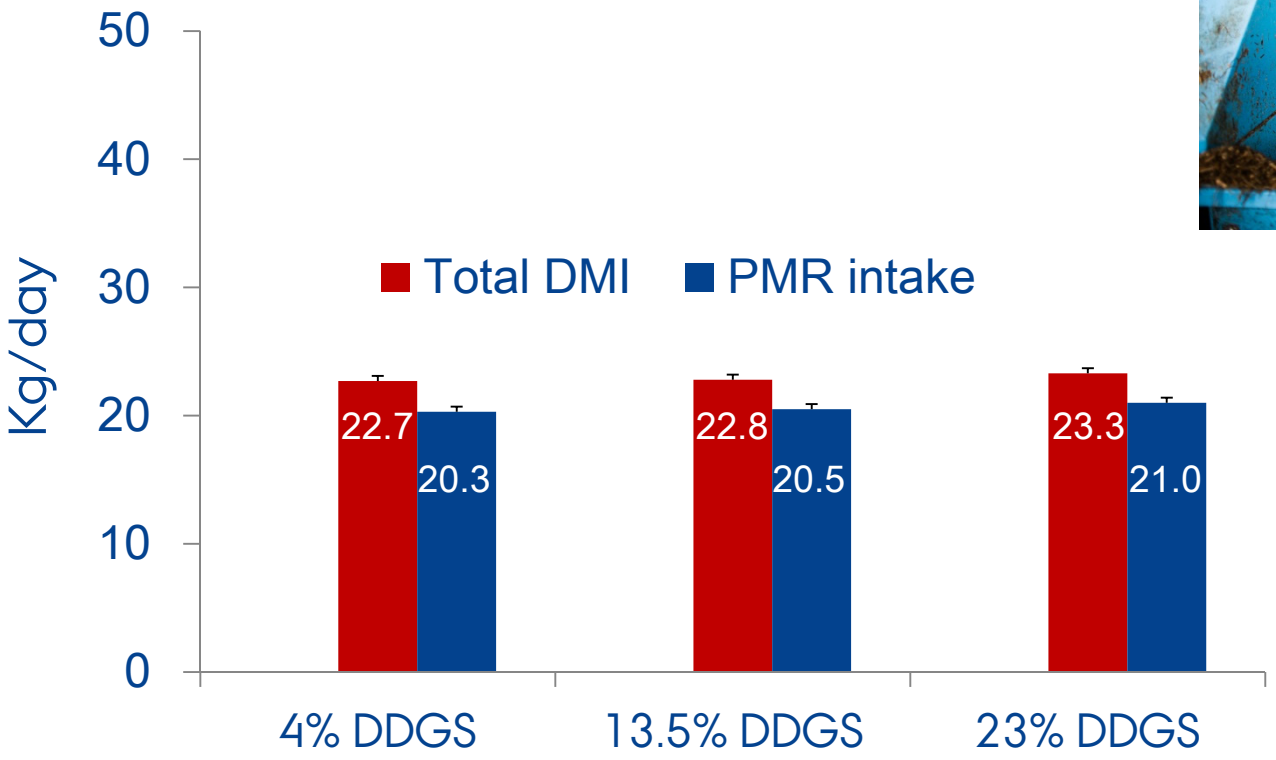
Exp. 1
Experimental design

- 48 Holstein cows in 3 x 3 latin square design
- 3-week periods: two weeks adaptation, one week sampling
- Ad lib. PMR, AMS including restricted concentrate
- DDGS: 4%, 13.5%, 23% DDGS (DM basis) of feed ration
- DDGS substitute matching mixture (CP and NDF) of soybean meal + rapeseed cake + dried beet pulp in PMR on energy-basis

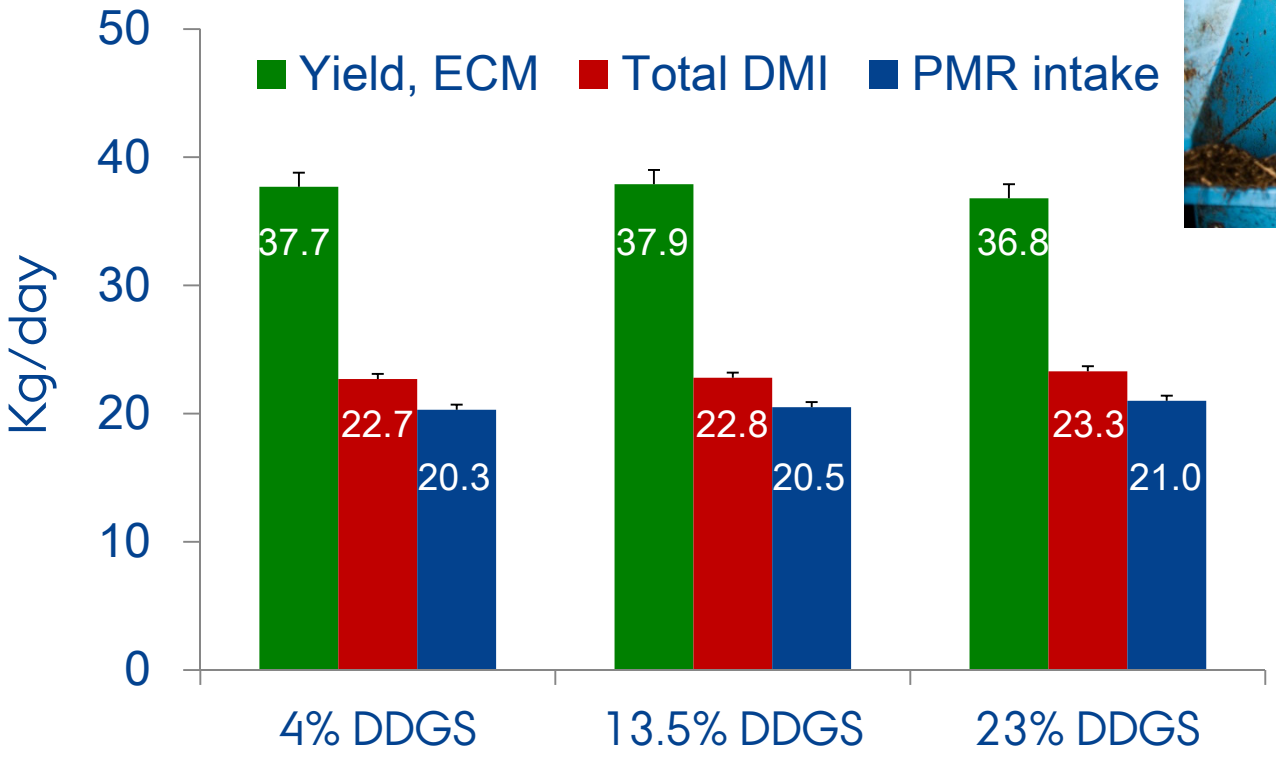
Experimental feeds

Dry matter basis	4% DDGS	13.5% DDGS	23% DDGS
DDGS, %	4.0	13.5	22.8
Soybean meal, %	7.4	3.6	0
Rapeseed cake, %	5.5	2.7	0
Dried beet pulp, %	5.5	2.7	0
Barley, %	4		
Wheat, NaOH, %	5		
Grass-clover silage, %	15		
Corn silage, %	46		
AMS concentrate, %	8		
Crude protein, %	16.7		
NDF, g/kg DM	314		
Starch, g/kg DM	253		

Exp. 1
Feed intake



Exp. 1
Feed intake and milk yield



Exp. 1
Feed intake and milk yield

	4% DDGS	13.5% DDGS	23% DDGS	SE	P-value
Milk, kg/day	38.4	38.1	36.8	1.3	0.005
Milk fat, kg/day	1.47	1.50	1.47	0.05	0.5
Milk protein, kg/day	1.31	1.31	1.25	0.036	<0.001
Visits AMS, no/day	2.8	2.8	2.7	0.11	0.04
AMS concentrate intake, kg/day	2.39	2.38	2.37	0.04	0.94

Summary exp. 1

› DDGS of good quality can substitute a soybean meal + rapeseed cake + dried beet pulp mixture in a mixed ration for dairy cows without effects on feed intake, ECM milk yield or milk quality

› Yield of milk and protein were slightly decreased at the highest dietary DDGS level

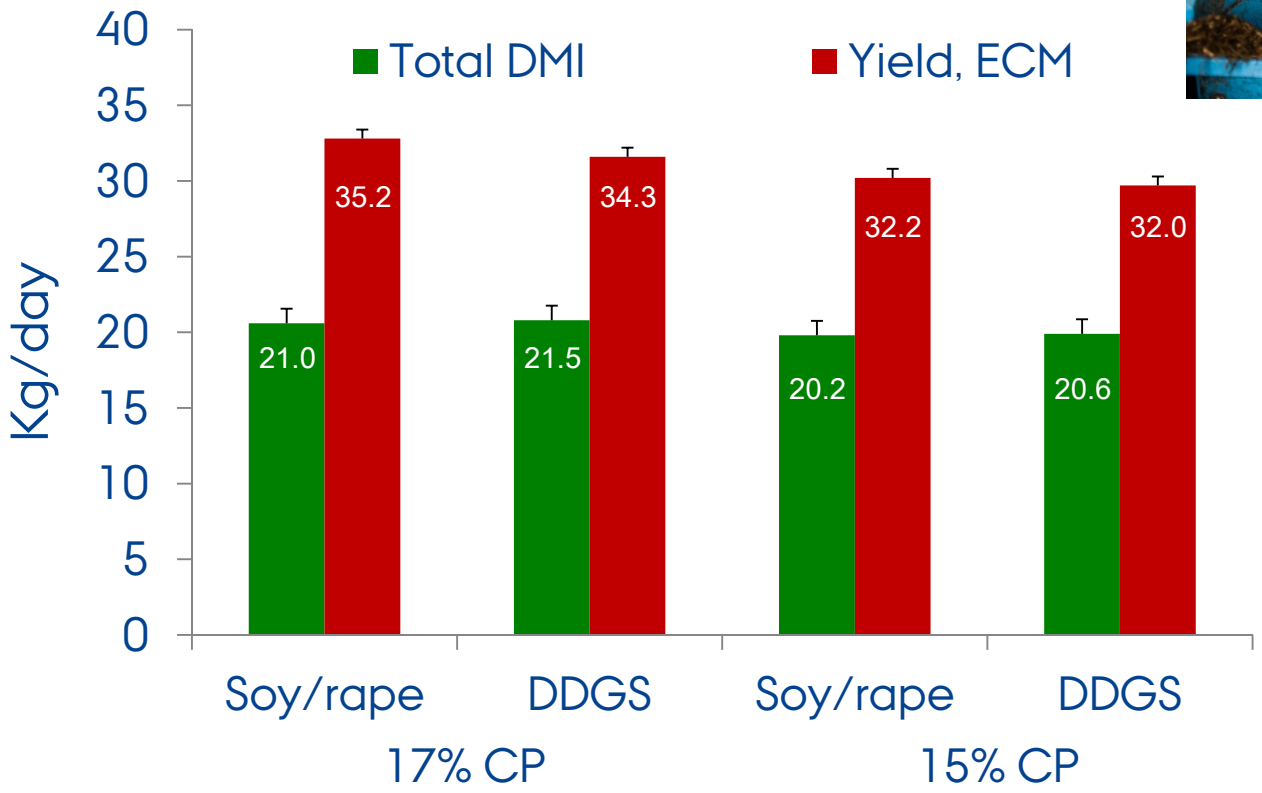
Exp. 2
Experimental design

- 30 Holstein cows in 4 x 4 latin square design
- 3-week periods: two weeks adaptation, one week sampling
- Ad lib. PMR, AMS including restrictet concentrate
- Treatments:
  - ➢ 15% vs. 17% crude protein
  - ➢ DDGS vs. matching ”soy/rape mixture”,
    15% (DM basis) of feed ration on energy-basis

Exp. 2
Experimental feeds

	15% crude protein		17% crude protein	
	"Soy/rape mixture"	DDGS	"Soy/rape mixture"	DDGS
DDGS, %		15.4		15.4
Soybean meal, %	6.2		6.2	
Rapeseed cake, %	4.6		4.6	
Dried beet pulp, %	4.6		4.6	
Soybean meal, %			7.5	
Dried beet pulp, %	7.5			
Barley, %	10.8			
Grass-clover silage, %	8			
Corn silage, %	46			
AMS concentrate, %	11			

Exp. 2
Feed intake and milk yield



Conclusion

› 15% vs. 17% dietary crude protein level reduced feed intake and milk yield

› No effects of substituting a soybean meal/rapeseed cake mixture by DDGS

› DDGS of good quality can substitute a soybean meal + rapeseed cake + dried beet pulp mixture in a mixed ration for dairy cows without effect on feed intake, ECM milk yield or milk quality