Replacing hexane by 2-methyloxolane for defatting soybean meal does not impair fattening performance of beef cattle supplemented with methionine

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Introduction

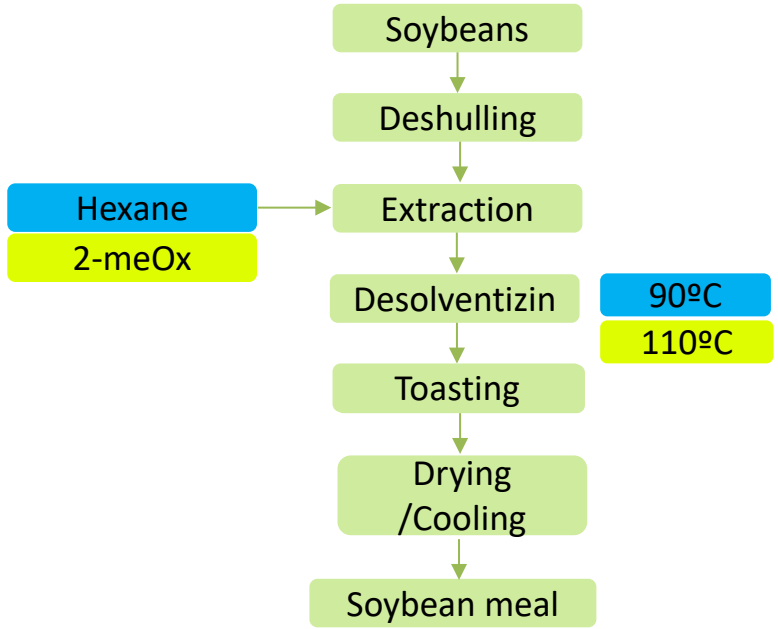
In 2022, 348 million tons of soybeans and 47 million tons of soybean meal were produced.

Soybean meal comprises two-thirds of the global feed protein output (Oil World, 2015)..

Hexane is the most used solvent for oil extraction in soybean meal production but poses health risks.

2-Methyloxolane (2-MeOx) is a bio-based alternative solvent.

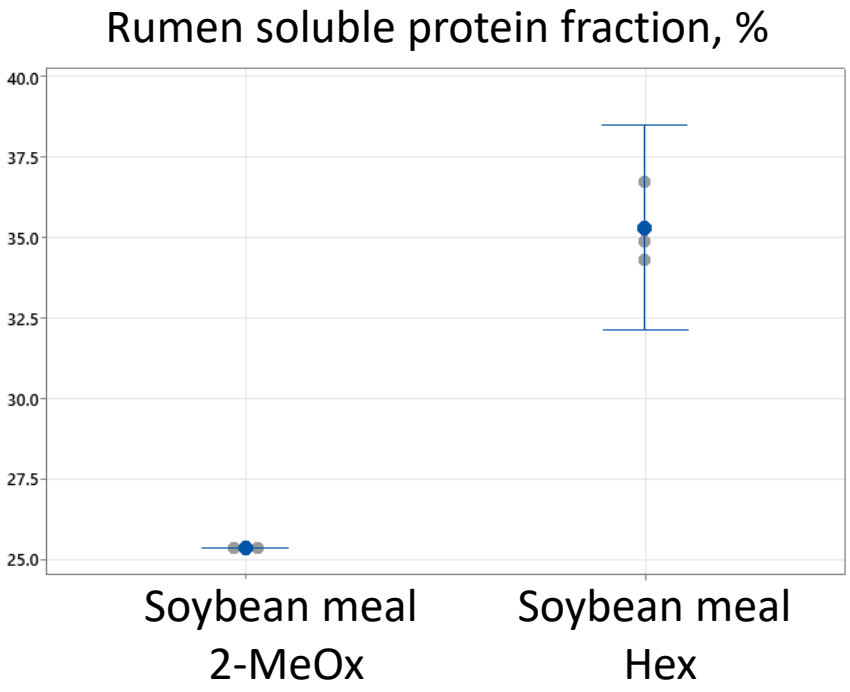
Flowchart showing the production of soybean meal



Wierup and Kristoffersen (2014)

Introduction

- Differences in the extraction process may promote differences in rumen protein availability
  - Impact on the microbial protein (RDP) to by-pass protein (RUP) ratio
- Because soybean is deficient in methionine and extraction with 2-MeOx might increase the by-pass to microbial protein ratio :
  - **Hypothesis** = soybean meal extracted with 2-MeOx could promote lower beef cattle performances than Hex soybean meal



Menoury et al., *in preparation*

Objectives

- To compare the in vivo performances and slaughtering traits of beef cattle fed grass silage diets that include soybean meal obtained using HEXANE vs 2-MeOx

- To evaluate the effect of rumen protected methionine supplementation with both soybean meal types

Materials and Methods

- 36 growing-fattening Charolais bulls (284 ± 30kg and 248 ± 22 days)
- Experimental design: factorial 2x2
  - 2 types of soybean meal (SBM)
  - 2 levels of rumen protected methionine (RPM)
- Dietary treatments
  - Hexane SBM : **Hex**
  - Hexane SBM + RPM : **Hex+M**
  - 2-meOx SBM : **2-meOx**
  - 2-meOx SBM + RPM: **2-meOx+M**
- 9 animals by treatment

Materials and Methods

- 270 days of experiment, three 90d-feed efficiency periods
- Animal body weight recorded every 14 days
- Automated feeders with collar devices to measure individual daily feed intake
- Feed were distributed and refusals were weighted every day

Materials and Methods

- Slaughter at INRA experimental facilities: carcass measurement and estimations of tissue composition
- Statistical analyses using mixed-effects models. Animals as random effects, with SBM type, RPM supplementation, and their interaction as fixed effects. Initial BW as covariable

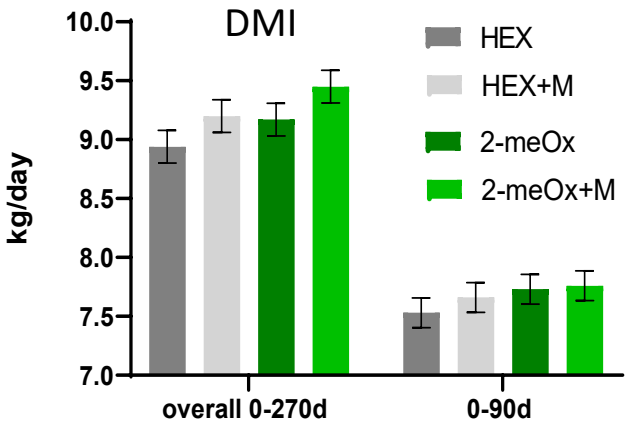
Materials and Methods

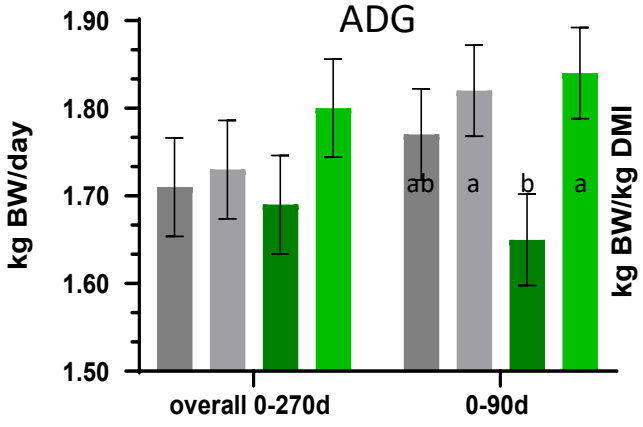
	Hex	Hex +M	2-meOx	2-meOx + M
Ingredients, %				
Grass silage	55	55	55	55
Wheat Straw	5	5	5	5
Wheat	15	15	15	15
Beet Pulp	14.4	14.4	14.4	14.4
Hexane Soybean Meal	9	9		
2-meOx soybean meal			9	9
Cane molasses	0,8	0,8	0,8	0,8
Premix	0,8	0,8	0,8	0,8
On-top Smartamine M		7 g		7g
Feed Values. INRA 2018				
NE, Mcal/kg DM	1.55	1.55	1.57	1.57
MP, g/kg DM	74	74	76	76
PDI/NE, g/Mcal	55	55	56	56
RPB, g/kg DM	19	19	20	20
LysDI/MetDI	3.69	2.84	3.64	2.80

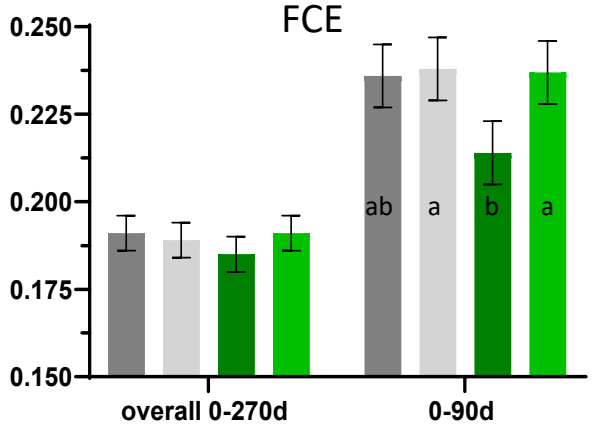
Results

No significant impact of SBM type neither of RPM on overall DMI (P>0.05)

During 1st feed efficiency test (0-90 d): RPM promoted greater average daily gain and feed conversion efficiency only in animals fed 2-meOx SBM (Interaction; $P \leq 0.02$)

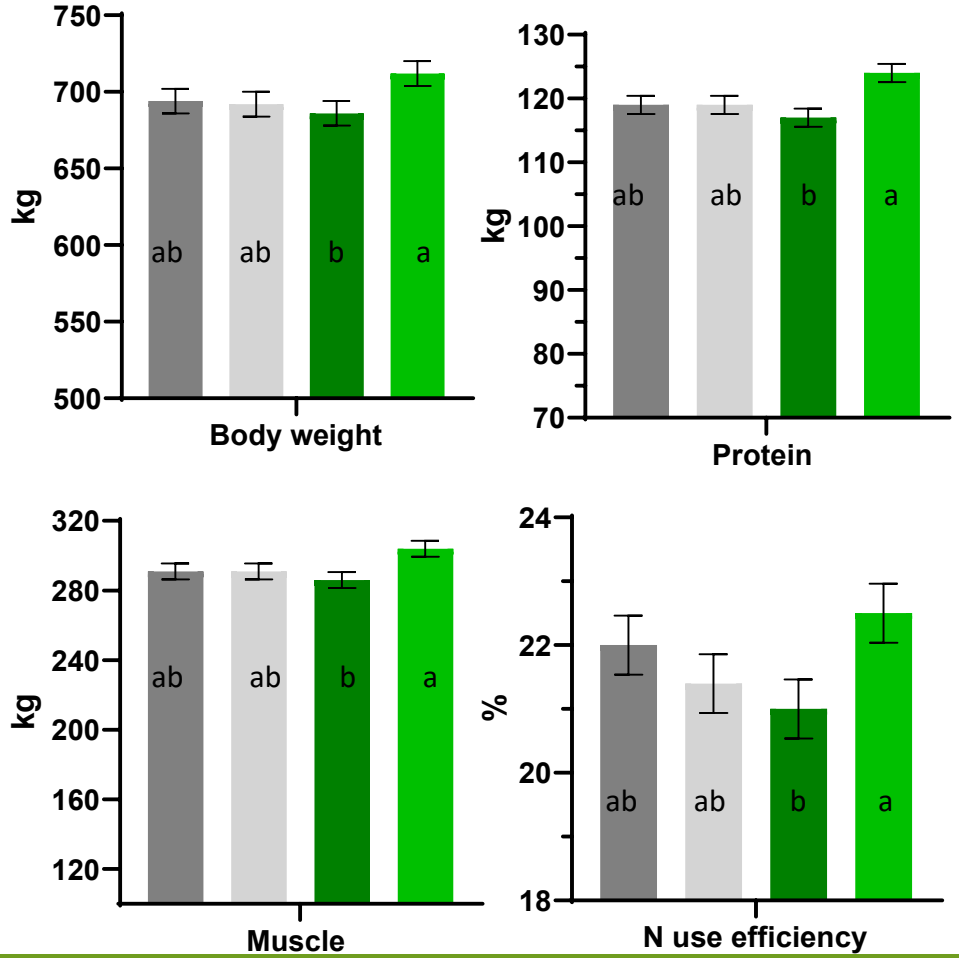






Results

- Slaughterhouse traits in accordance with in vivo performance
- RPM only had a significant effect in treatment 2-meOx , the same results can be observed for estimations of total muscle and protein in the whole body (kg) and N use efficiency



Conclusion

Our results highlight the potential of using 2-methyloxolane as a bio-based solvent for soybean meal production in beef cattle diets but suggest a higher methionine deficit compared to hexane soybean meal

Thank you for your attention

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