



**Turkey Science and Production
Conference**
19th March 2025

Effect of balanced proteins and energy level on starter/grower and finisher period - Performance, economic, meat quality and environmental impact

What a good image to describe the balanced between protein and energy!



Louis Bielle-Biarrey after his try during the match Ireland – France – 6 Nations 2025

Protein & energy

Protein => Muscle

Energy => Fuel

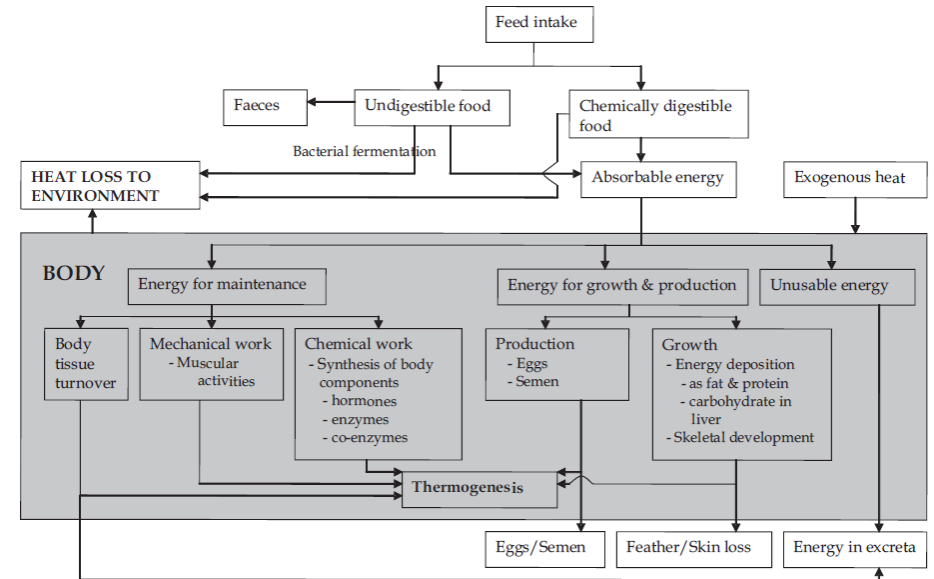
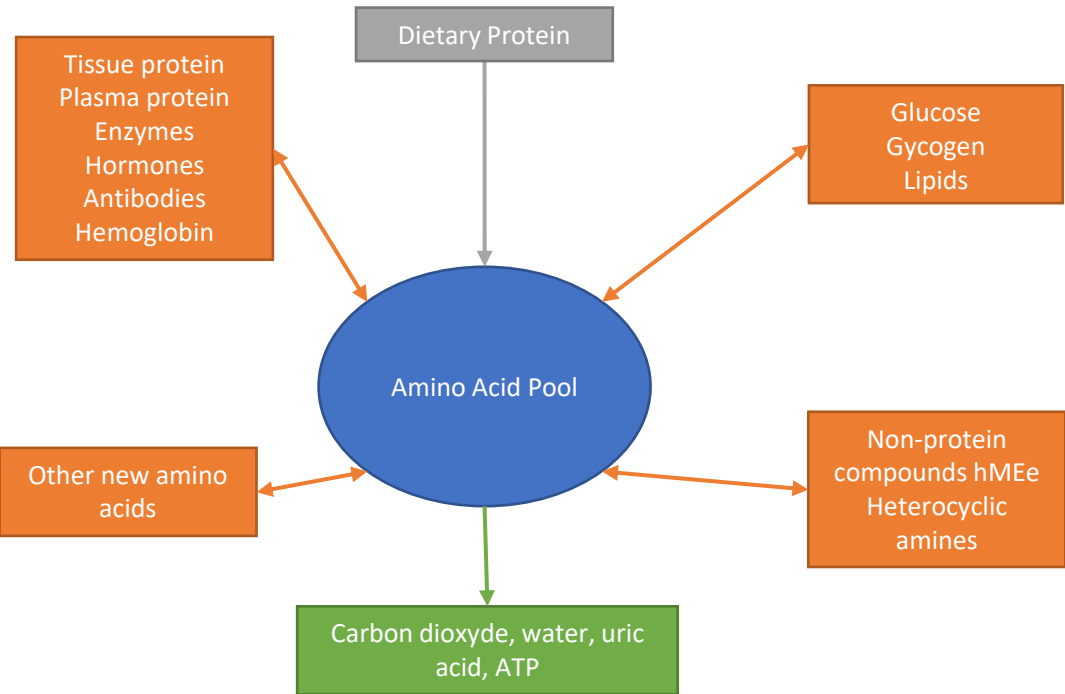


Diagram of the energy input and utilisation in poultry

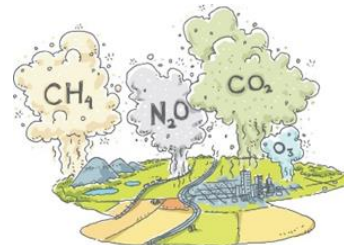
Adapted from Ophardt & al, 2003

Priyankarage et al, 2011

- Major component of feed price and cost production
- Great evolution in turkey production since last published requirements (NRC 1994, INRA, FEDNA, Genetics suppliers, ...)

Objectives of the trial

- Animal model Male Premium turkeys
- To describe the effect of balanced protein from 0 to 56 days with 2 level of energy
- And, from 56 to 112 days, the effect of energy with 2 level of balanced protein
 - on performance : weight, ADG, Feed intake, FCR
 - on meat quality : Breast meat yield
- Economic simulation
- Environmental impact



Material and Methods

■ Protocol

- 528 Aviagen Premium males
- From 1 to 56 days : Response to balanced protein with 2 level of energy
- From 57 to 112 days: Response to Energy with 2 level of balanced protein

- Allocation at arrival:
 - 48 pens of 2,6m²
 - 8 groups (66 males per group)
 - 6 repeats per groups of 11 males

- Period 15/06/2022 to 07/10/2022
- Euronutrition, France



Material and Methods

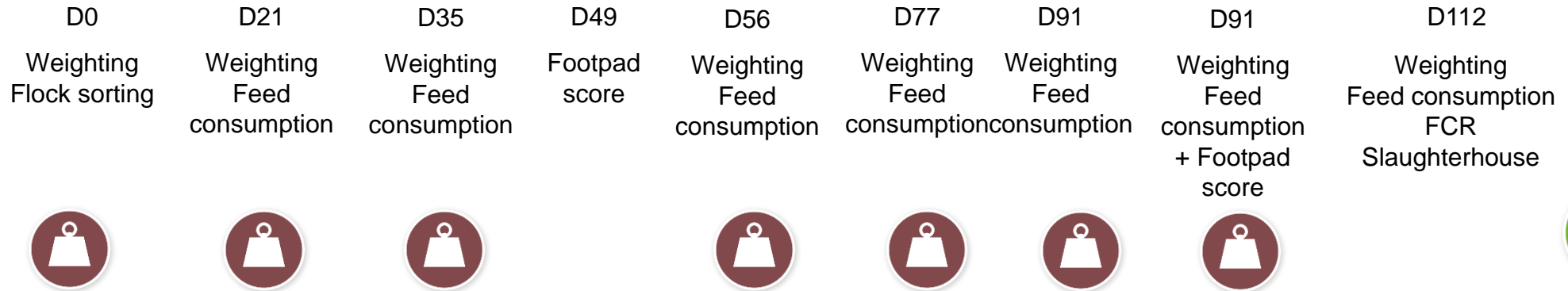
Groups		1	2	3	4	5	6	7	8	
Period 0-56 days		ME-Lys--	ME-Lys-	ME-Lys+	ME-Lys++	ME+Lys--	ME+Lys-	ME+Lys+	ME+Lys++	
Starter	ME – kcal/kg	2685				2825				
0-21 days	Dig Lys. %	1,50	1,55	1,60	1,65	+150kcal		1,60	1,65	
Grower 1	ME – kcal/kg	2785				2915				
21-35 days	Dig Lys. %	+0,05%		1,48	1,53	1,38	1,43	1,48	1,53	
Grower 2	ME – kcal/kg	2835				2965				
35-56 days	Dig Lys. %	1,22	1,27	1,32	1,37	1,22	1,27	1,32	1,37	
Period 56-112 days		ME-Lys+	ME-Lys+	ME+Lys+	ME++Lys+	ME-Lys--	ME-Lys-	ME+Lys-	ME++Lys-	
Finisher 1	ME – kcal/kg	2975	3050	3225	3300	+0,10%		3050	3125	3200
56-77 days	Dig Lys. %	+75kcal		1,18	1,18			1,08	1,08	
Finisher 2	ME – kcal/kg	3225				3300				
77-91 days	Dig Lys. %	1,09				0,99				
Finisher 3	ME – kcal/kg	3125	3200	3275	3350	3125	3200	3275	3350	
91-112 days	Dig Lys. %	1,06				0,96				

* According to Techna France Nutrition matrix and energy system for commercial turkeys

Material and Methods

Period 0-56 days

Period 56-112 days



■ Environmental impact – Climate change



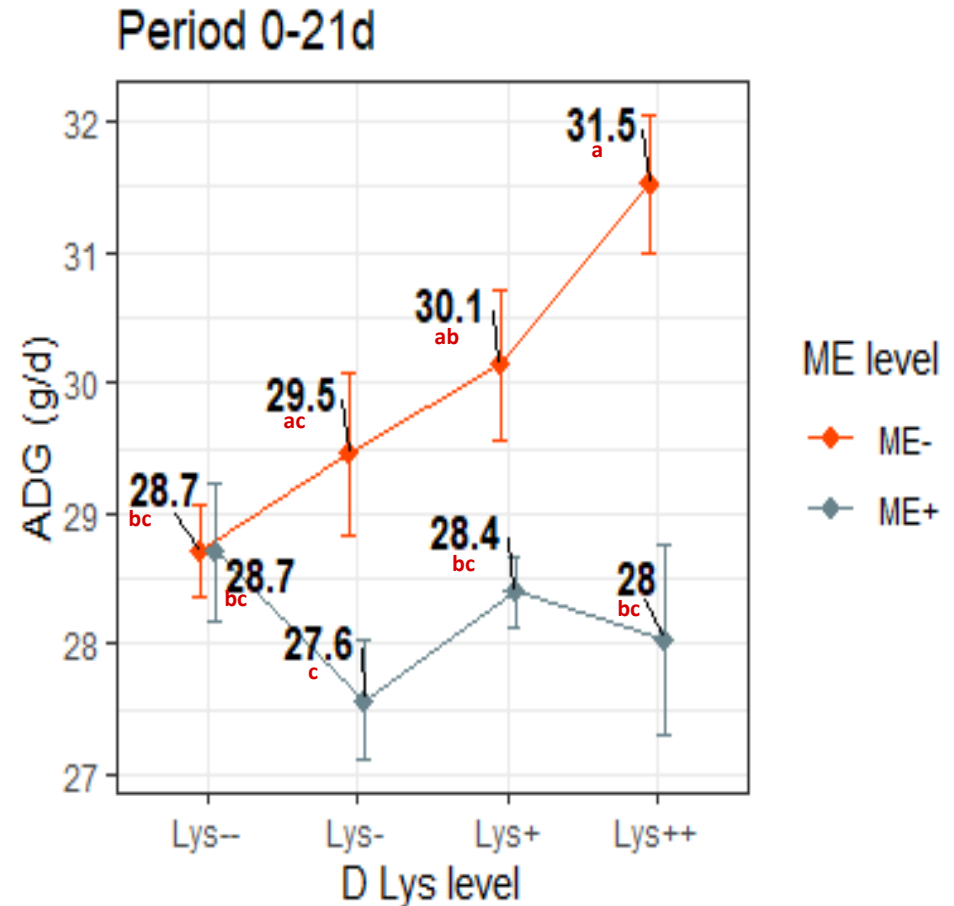
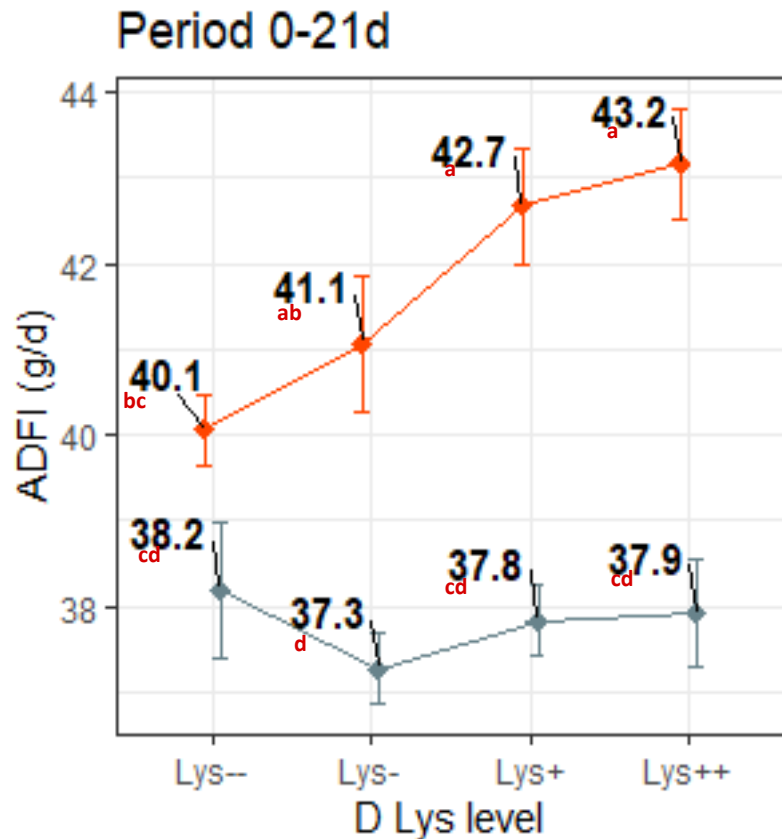
- GFLI value for Soybean meal, Sunflower meal, soya oil and Palm oil



- Ecoalim value for others grains – France as the area of production

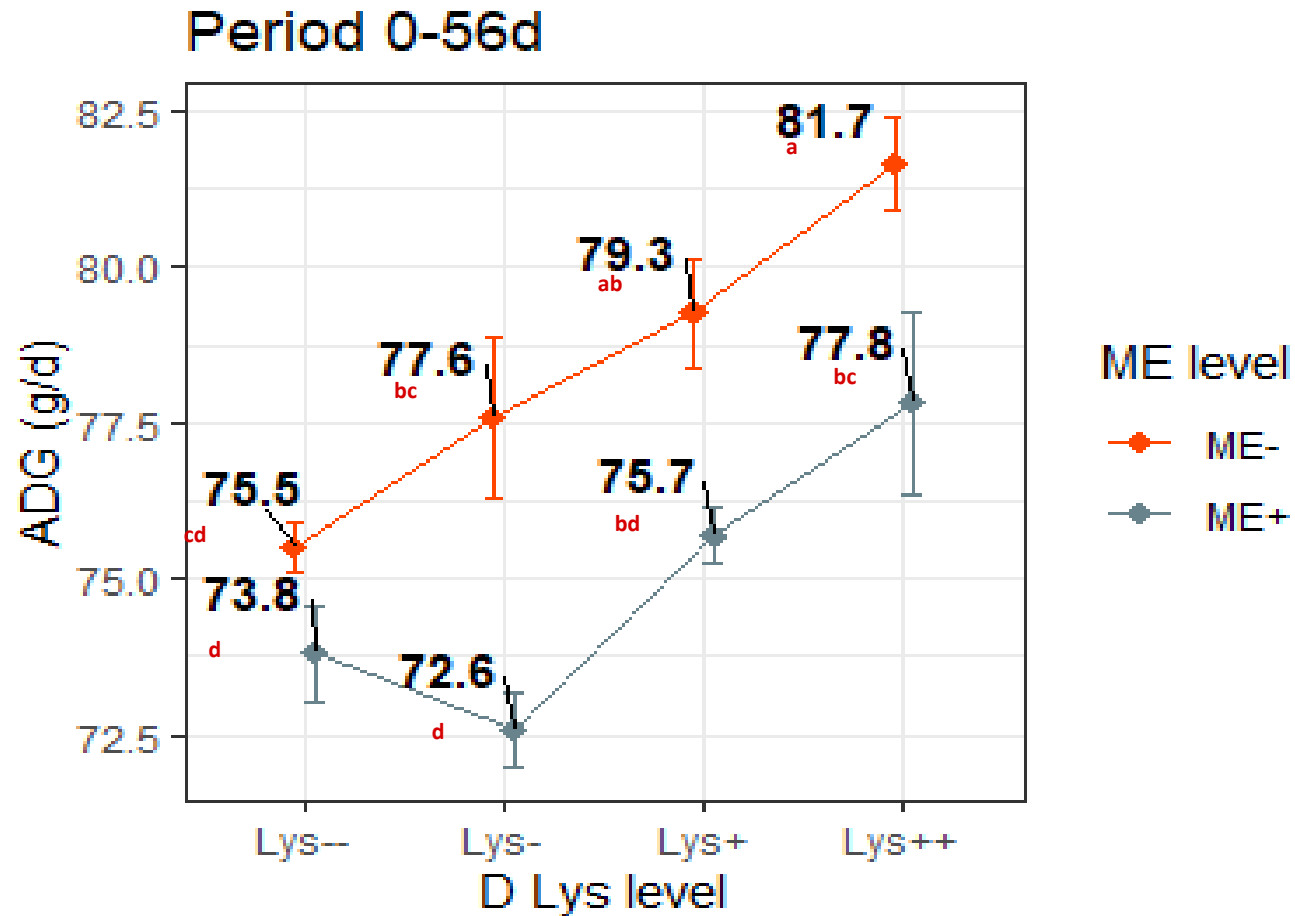
Results – Feed intake & impact on Growth 0-21 days

Period 0-56 days



- Feed intake and growth decrease significantly with high energy level ($P < 0,05$)
- Growth increase with the increasing of Lysine ($P < 0,05$)

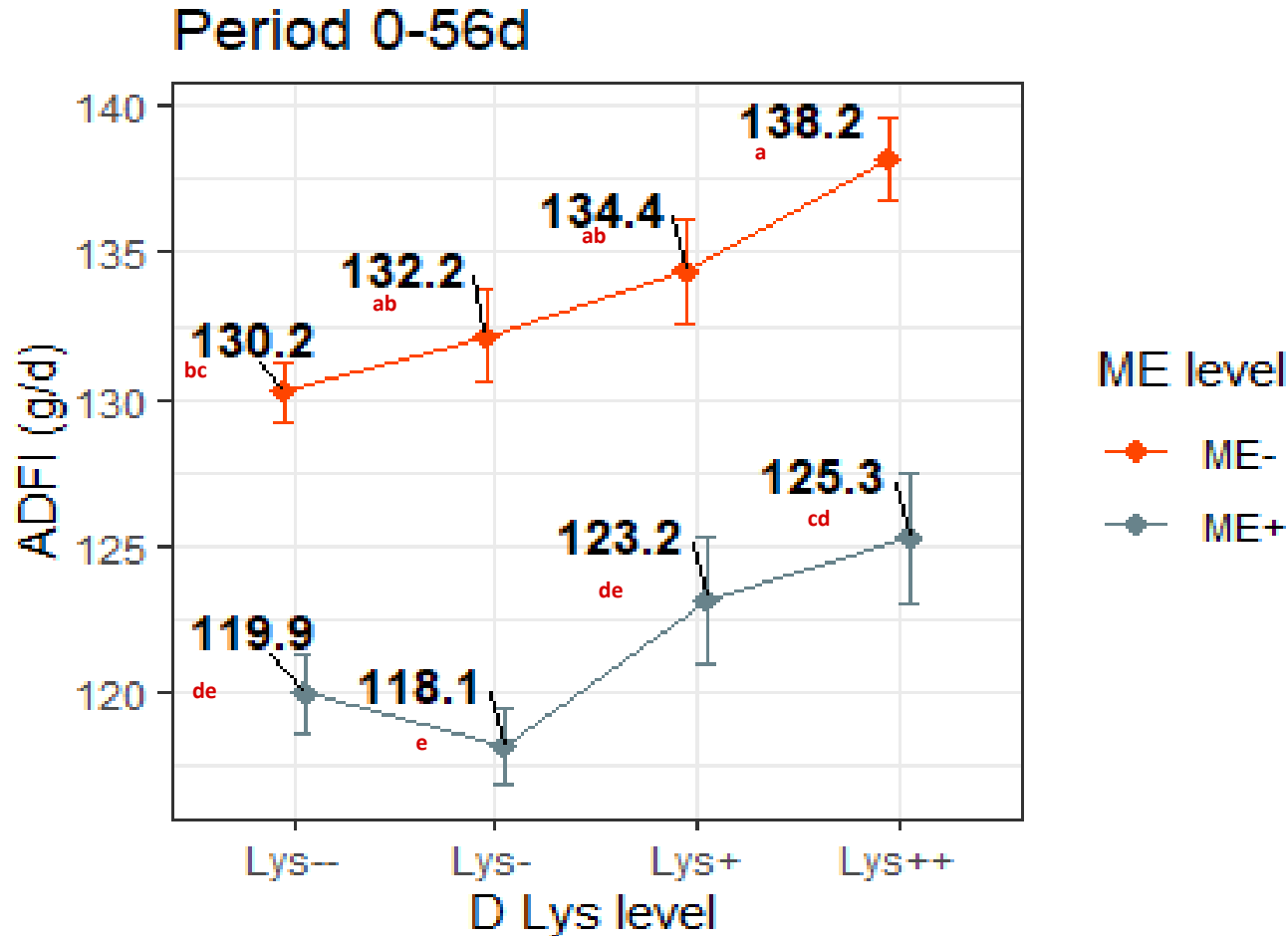
Results – ADG 0-56 days



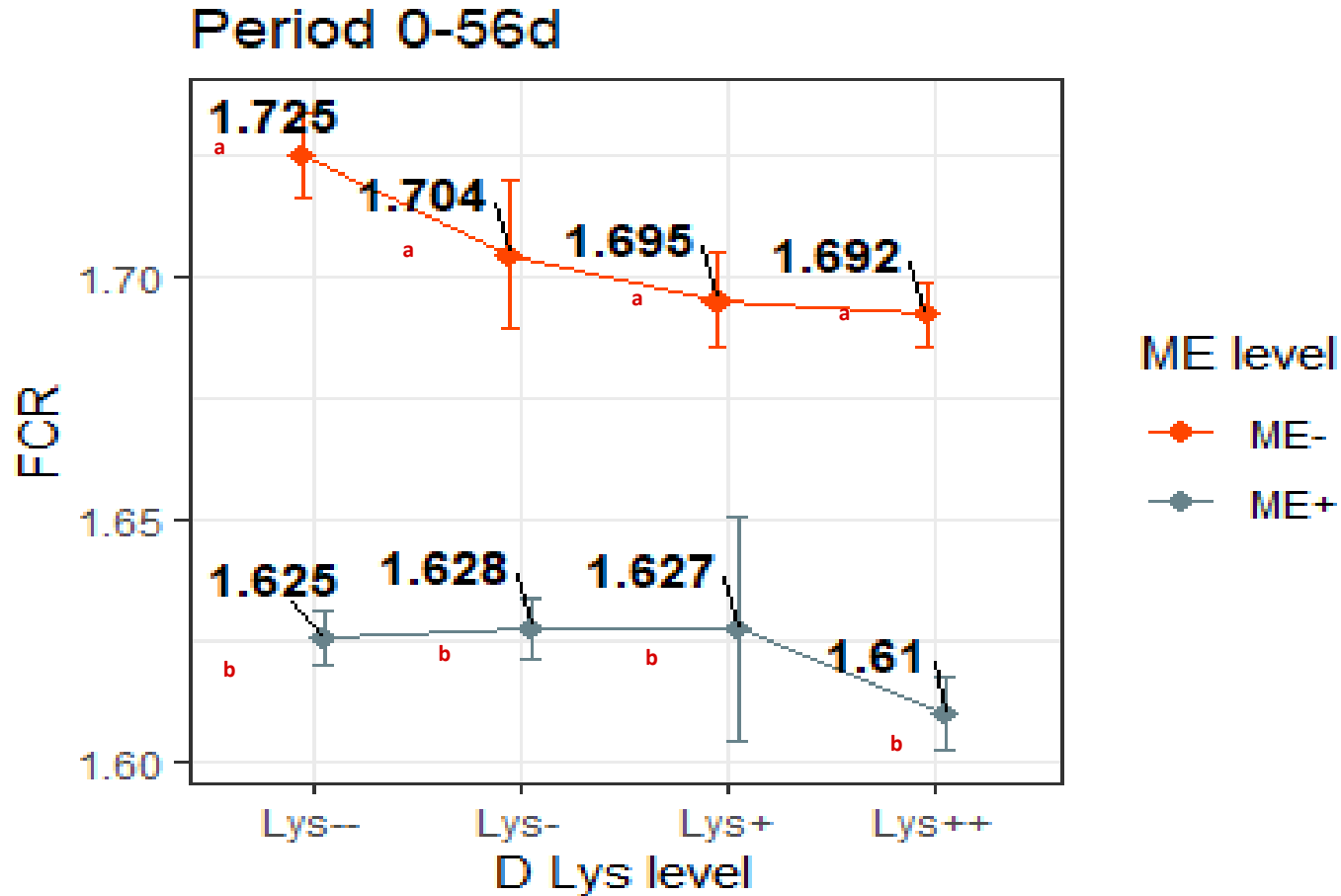
- The ADG increase with the increasing of the dig. Lysine ($p < 0,0001$)
- The ADG decrease with high energy level ($p < 0,0001$)

Results – Average Daily Feed Intake 0-56 days

Period 0-56 days



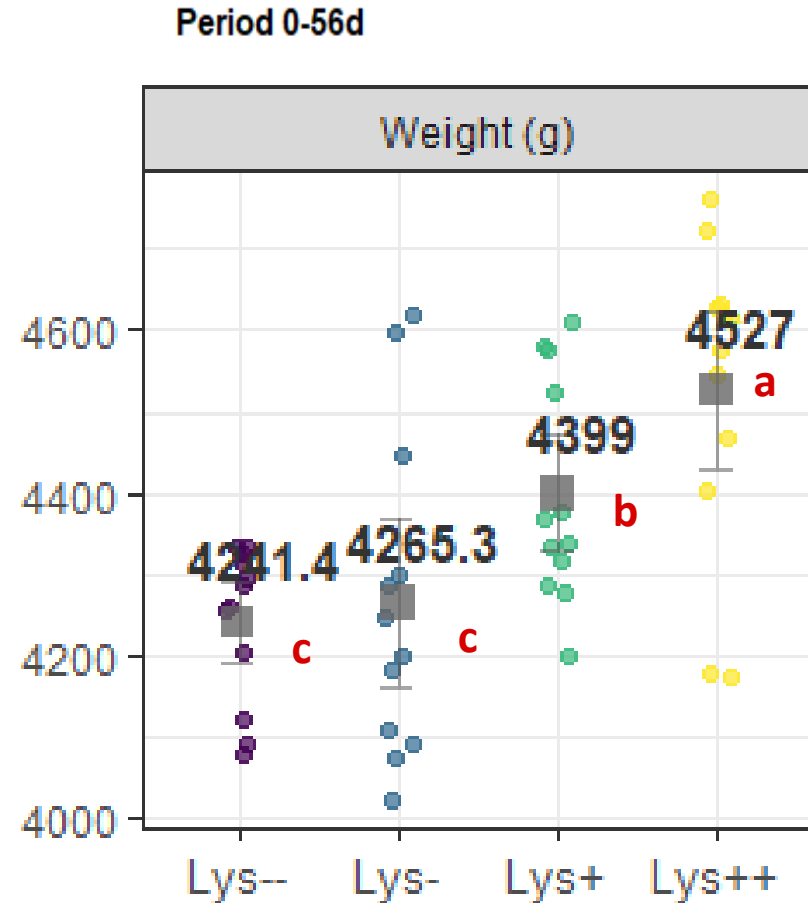
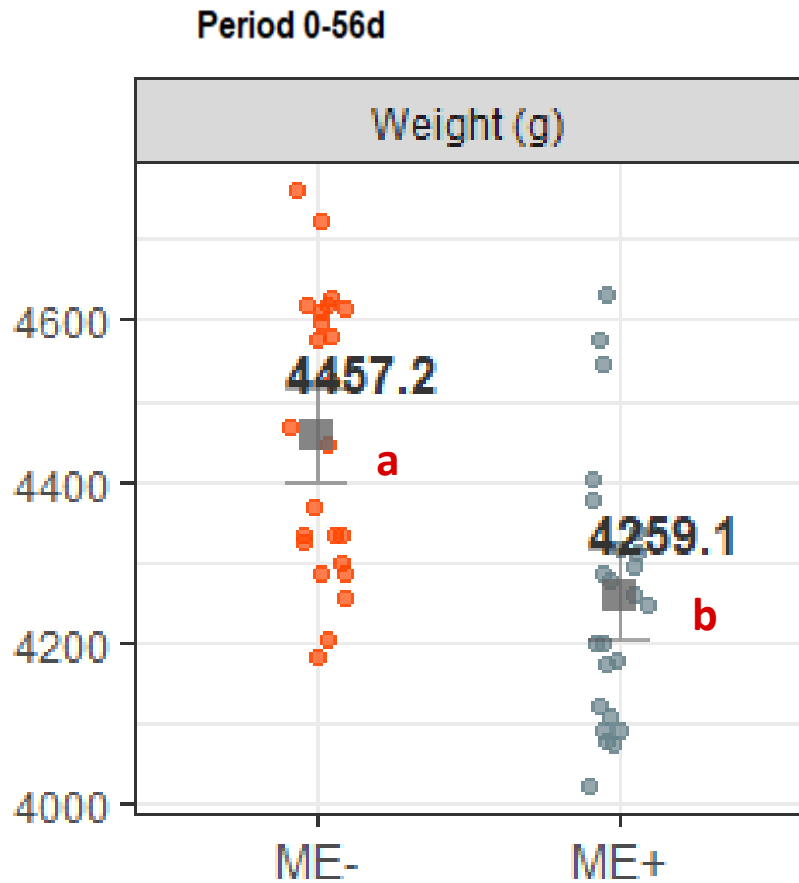
- The ADFI increase with the increasing of the dig. Lysine ($p < 0,0001$)
- The ADFI decrease with high energy level ($p < 0,0001$)

Results – FCR
0-56 days

- Dig. Lysine have no impact on FCR ($p=0,231$)
- ME decrease the FCR ($p<0,0001$)

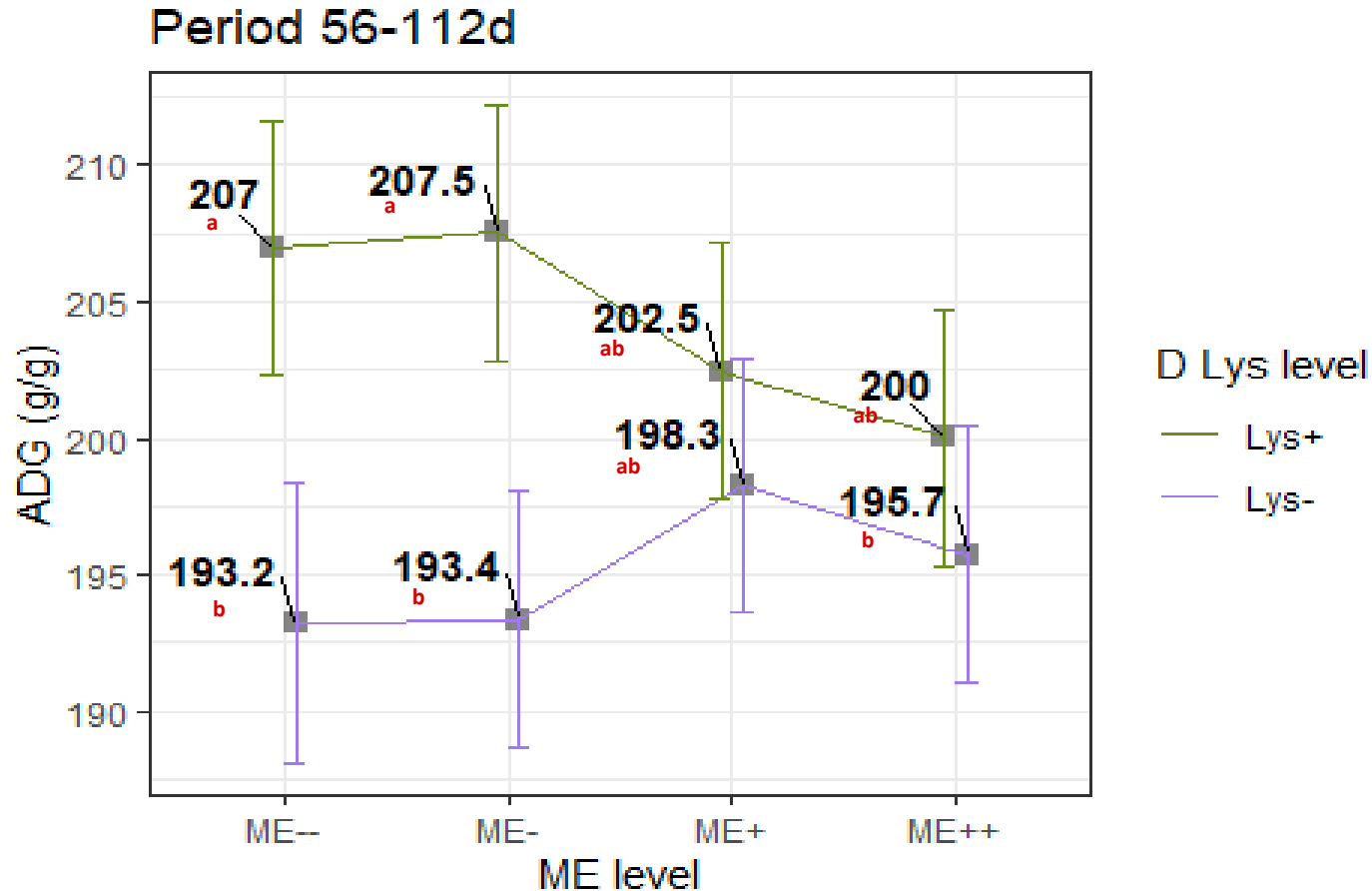
Results – Body Weight – 0-56 days Energy or Dig Lysine?

Period 0-56 days

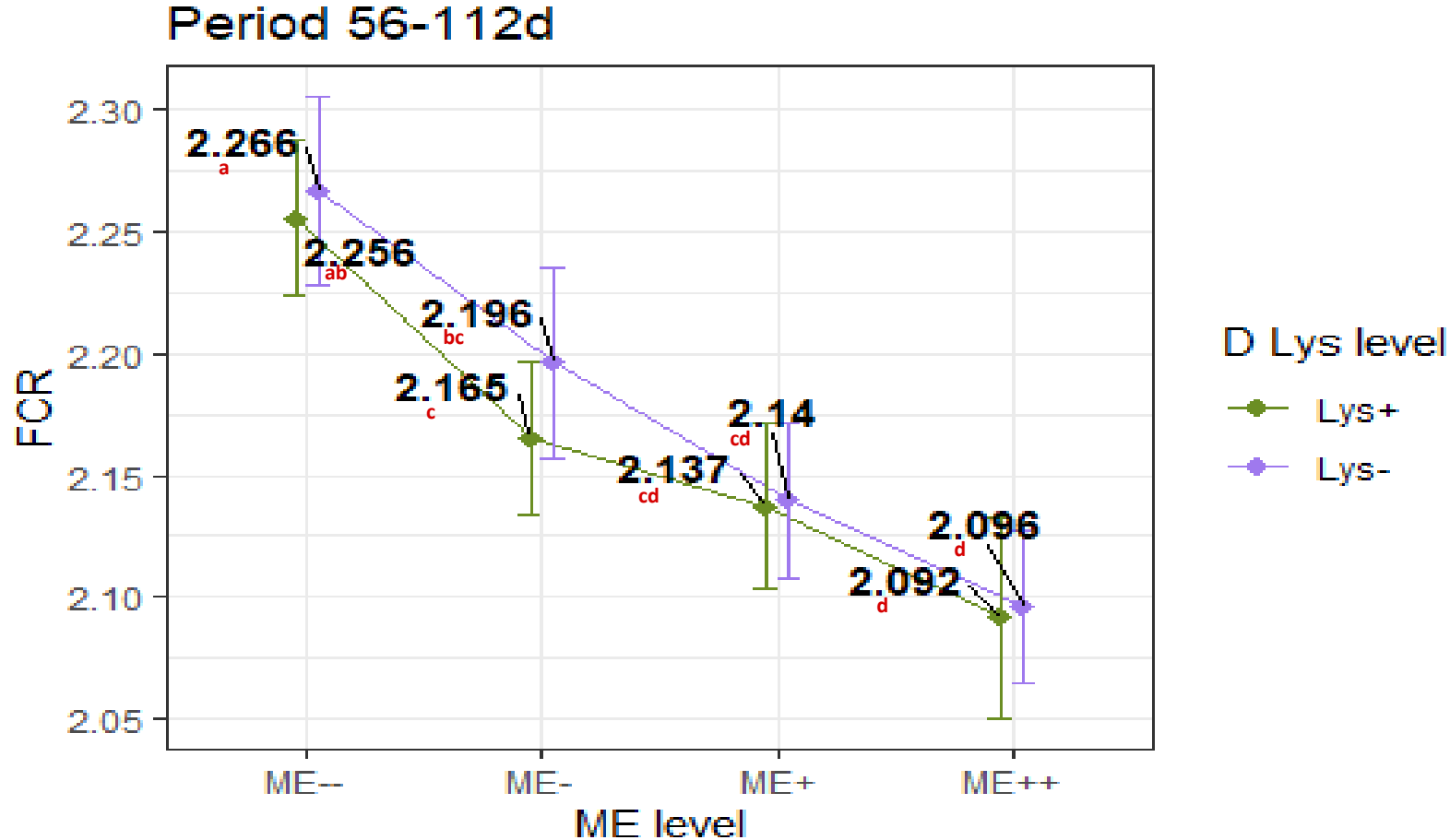


- Best strategy to achieve a better body weight for the period 0-56 days is low energy cross with high dig. Lysine level
- 286g between low lysine and high dig lysine => +6%

Results – ADG 56-112 days

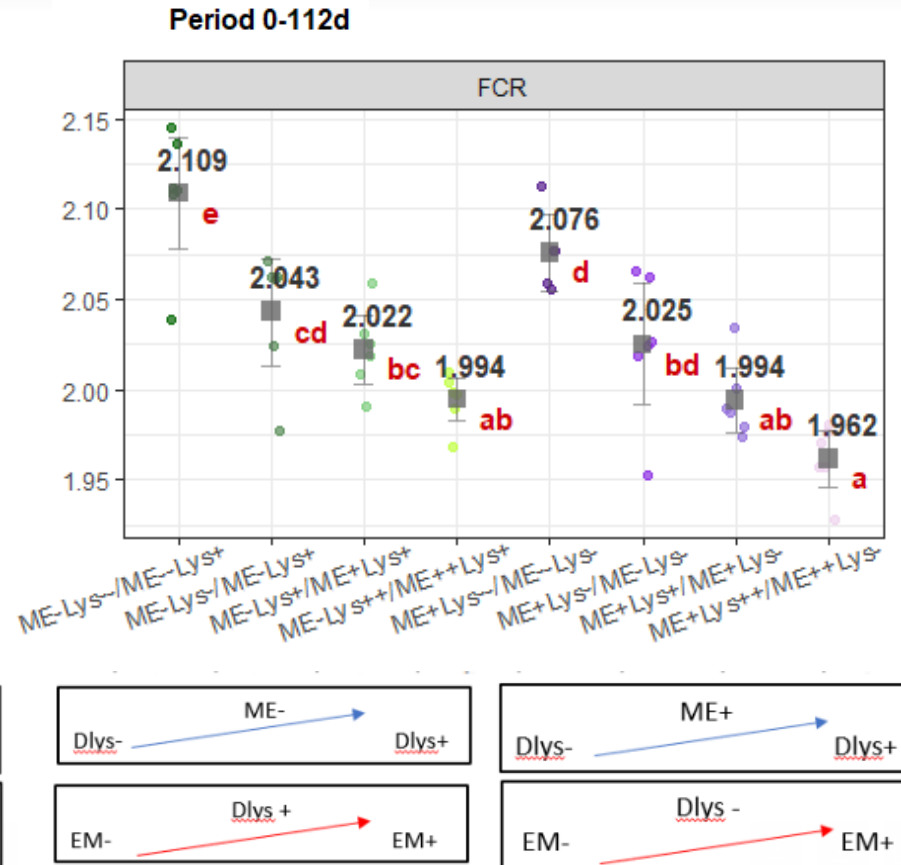
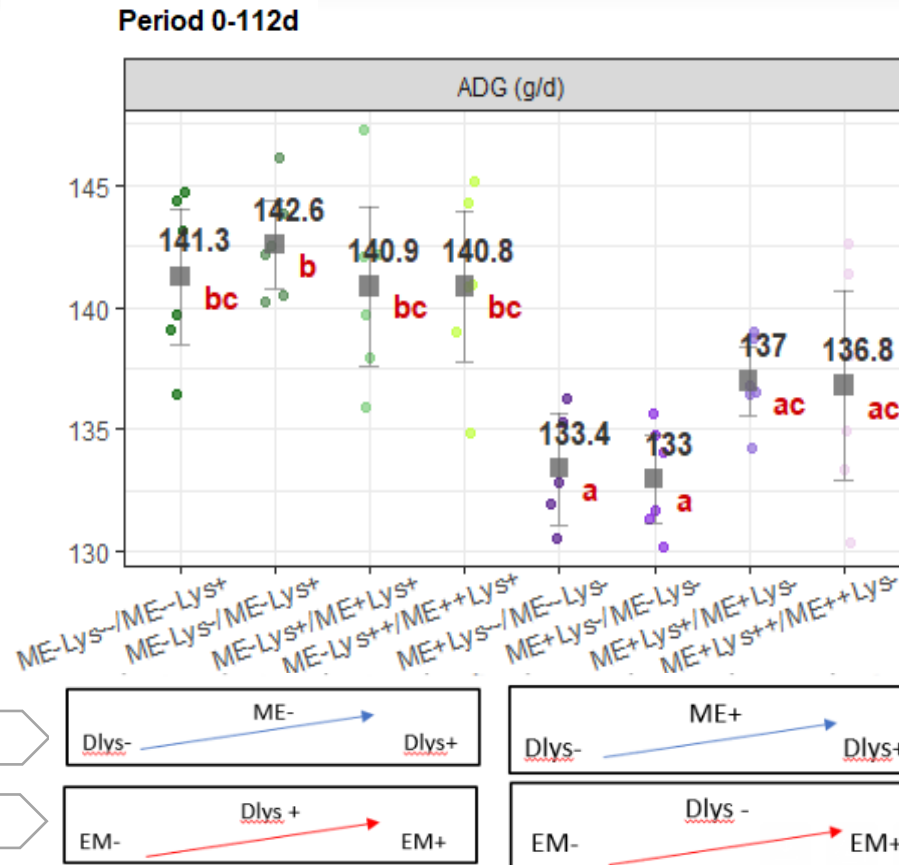


- ME level tend to have an impact on ADG(P=0.076)
- Dig Lysine level increase the ADG (p<0,0001)

Results – FCR
56-112 days

- The increasing of ME have a high significant impact on FCR ($p < 0,0001$)

Results – ADG & FCR 0-112 days



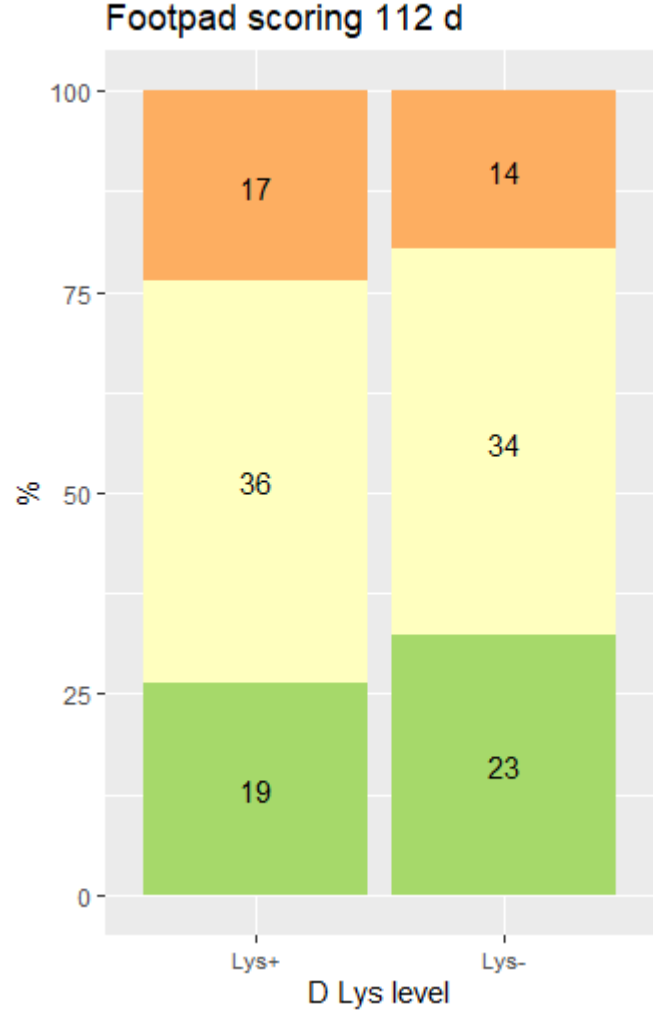
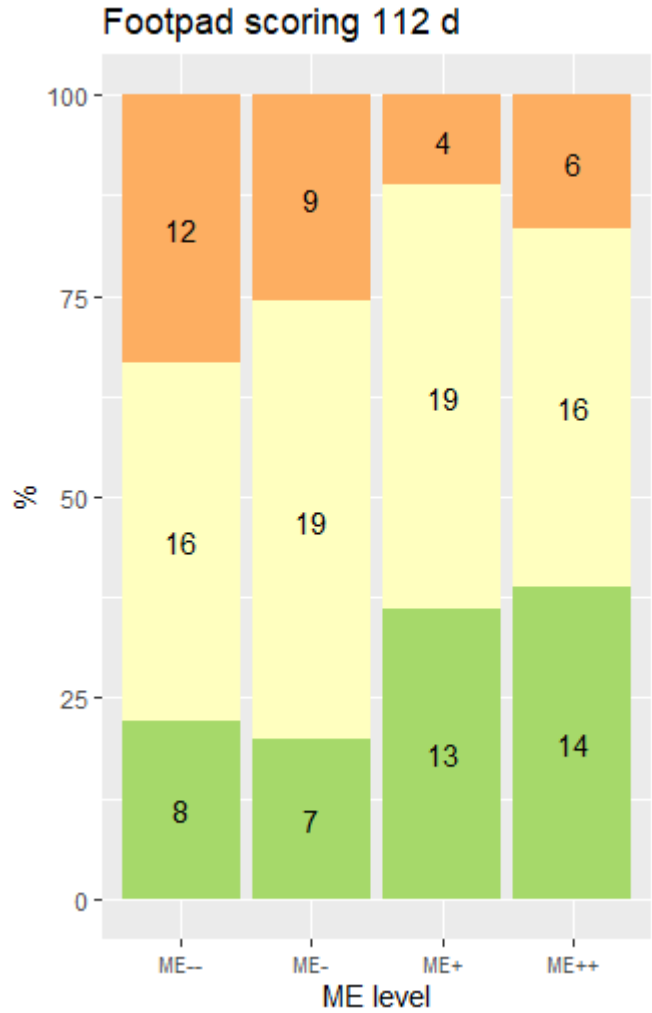
- On overall period, best **strategy for weight** give an advantage for low energy level during 0-56 days and high digestible lysine during 56-112 days
- FCR decrease with the increasing of energy during the period 56-112 days
- ME tend to have an impact on ADG

Feet Pododermatitis Scoring 91 days



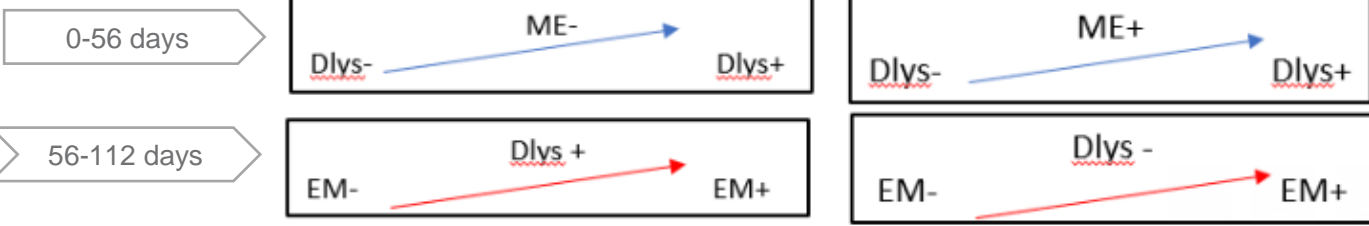
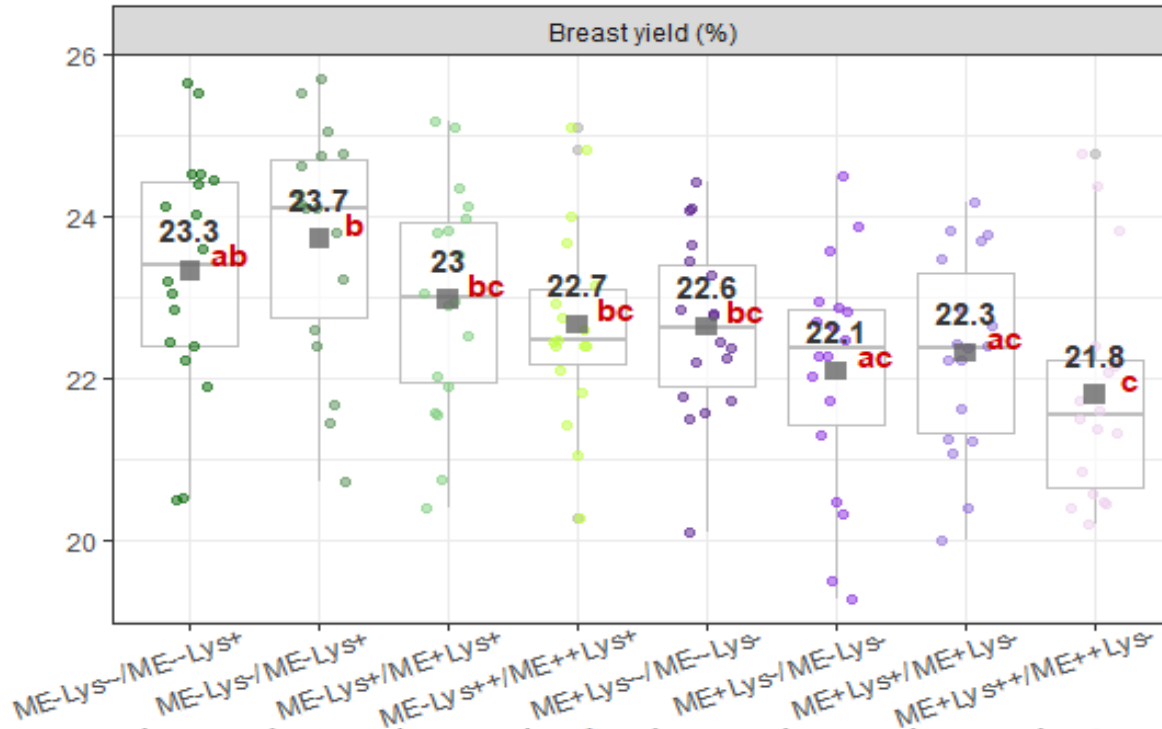
Score 1 – No lesion

Score 5 – deep lesions



- ME tends to decrease the Pododermatitis score at 112 days
- No significant impact of the Dig.Lysine on the Pododermatitis score at 112 days

Results – Meat quality Slaughtering at 112 days



- Better breast meat yield for the strategy low energy during starting period and high dig. Lysine for the fattening period
- More energy during the fattening period tends to decrease the breast meat yield

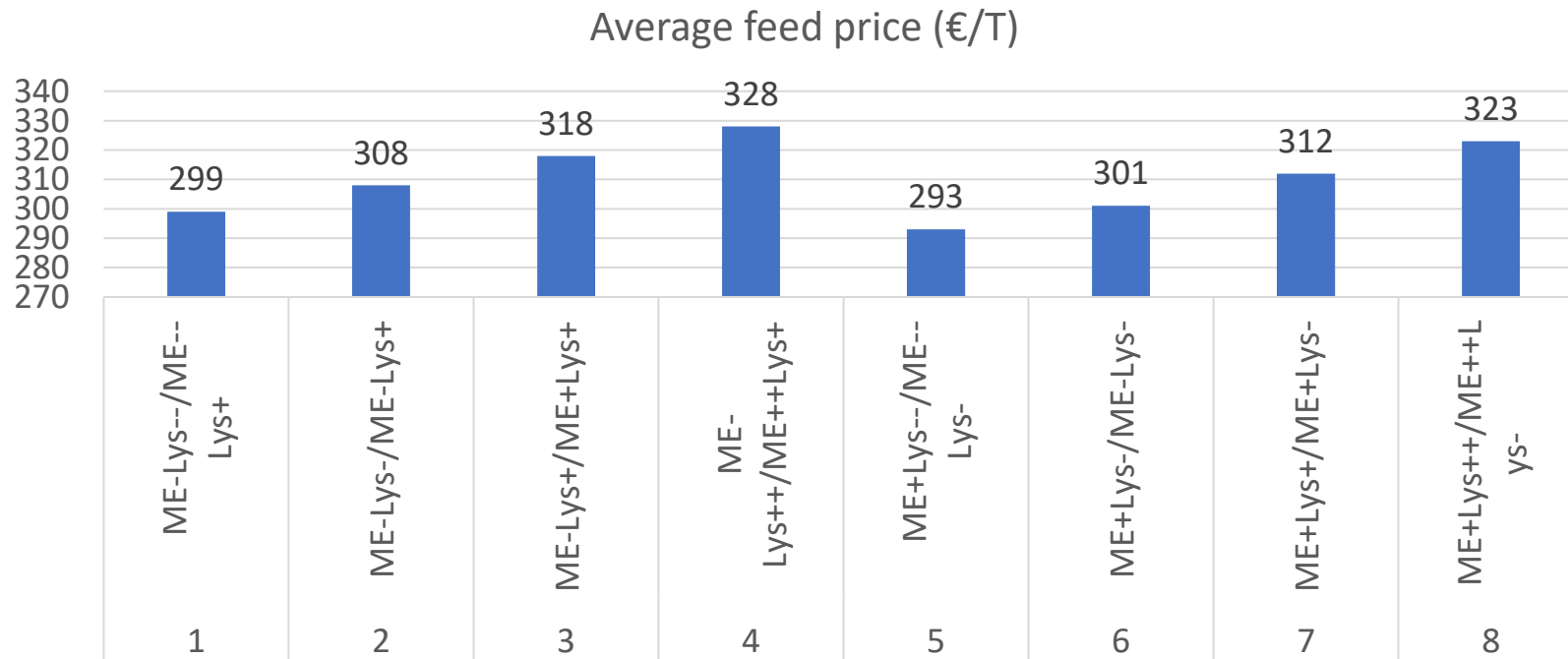
Discussion – Economic simulation

- Economic criteria evaluated :

$$\text{Feed price (€ per ton of feed)} = \sum_{\text{phase}} \text{for each} (\text{feed quantity of the phase} \times \text{feed price of the phase})$$

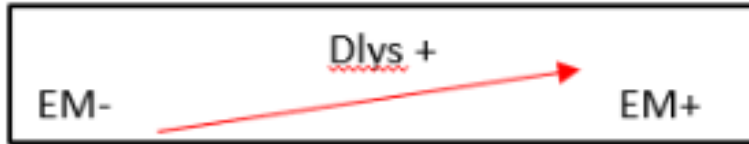
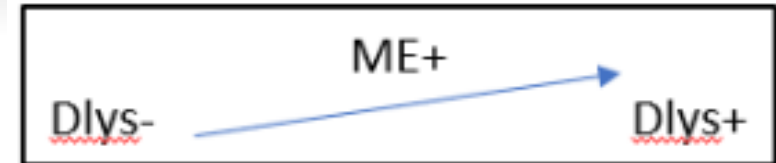
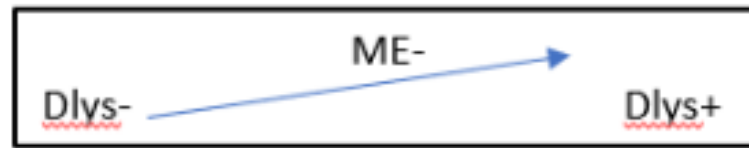
$$\text{Feed cost (€ per ton of live birds)} = \text{Feed price} \times \text{FCR}$$

$$\text{Breast Feed cost (€ per ton of breast)} = \text{Feed price} \times \text{Breast FCR} = \text{Feed price} \times \text{FCR} \times \frac{\text{Mean weight}}{\text{Mean breast yield}}$$





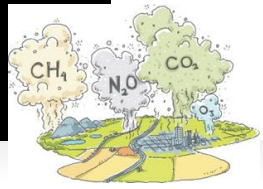
Discussion – Economic simulation



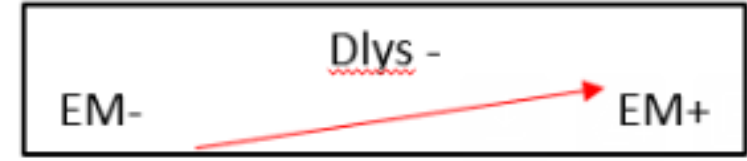
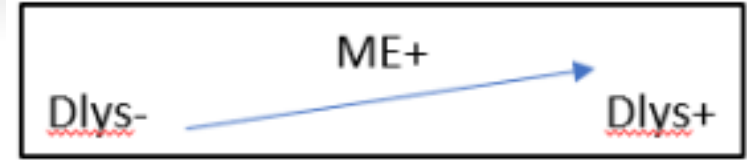
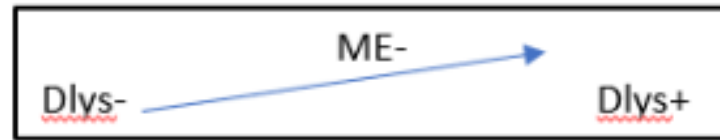
Groups	1	2	3	4	5	6	7	8
	ME-Lys-- /ME--Lys+	ME-Lys- /ME-Lys+	ME- Lys+/ME+L ys+	ME- Lys++/ME+ +Lys+	ME+Lys-- /ME--Lys-	ME+Lys- /ME-Lys-	ME+Lys+/ ME+Lys-	ME+Lys++/ ME++Lys-
Average feed price (€/T)	299	308	318	328	293	301	312	323
Final body weight at slaughterhouse (kg)	15,88	16,03	15,84	15,84	15,00	14,95	15,40	15,38
Technical FCR	2,109	2,043	2,022	1,995	2,076	2,025	1,994	1,962
Feed cost - €/ton of live bird	630	629	643	654	608	610	622	633
Breast meat yield - %	23,3	23,7	23,0	22,7	22,6	22,1	22,3	21,8
Feed cost - €/ton of breast	2705	2656	2795	2880	2691	2762	2789	2905



- Best technical performance isn't equal to best economic performance!



Discussion – Environmental impact



Groups

1 2 3 4 5 6 7 8

	ME- Lys-- /ME-- Lys+	ME- Lys- /ME- Lys+	ME- Lys+/ ME+Ly s+	ME- Lys++/ ME++Ly s+	ME+Ly s-- /ME-- Lys-	ME+Ly s-/ME- Lys-	ME+Ly s+/ME +Lys-	ME+Lys ++/ME+ +Lys-
Climate change (kg eq CO2/T feed)	1730	1787	1865	1940	1607	1680	1761	1835
Climate change (kg CO2/kg live bird)	3,65	3,65	3,77	3,87	3,34	3,40	3,51	3,60
Climate change (kg CO2/kg Carcass)	4,76	4,78	4,95	5,06	4,37	4,47	4,63	4,73
Climate Change (kg CO/kg breast)	15,65	15,41	16,40	17,05	14,76	15,40	15,75	16,51



- Best technical performance isn't equal to best environmental performance
- More protein = more soybean meal = more impact on environment

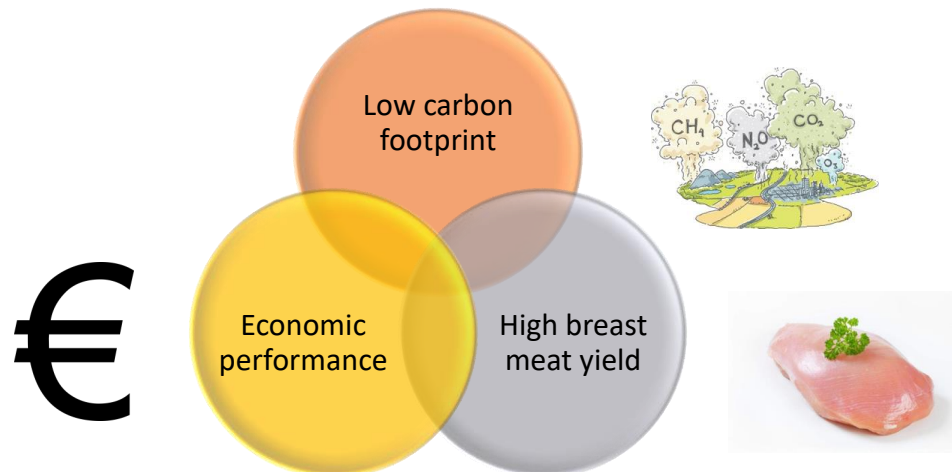
Conclusion

- Balanced protein and energy level is important during the starting period
 - Sometimes too much doesn't mean a better performance
- Body weight at 21 days would have an impact on the final body weight
- Energy level during the fattening period have an impact on the FCR

- In terms of economical aspect, High performance doesn't mean high economic performance

- The decrease our carbon footprint, we have to consider the balanced protein intake as a good lever

- Group N°2 strategy might be a good option;
 - Low carbon footprint – high breast meat yield and better economic performance





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