The carbon footprint, nitrogen and phosphorus efficiency in boars, barrows and immunocastrates

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Sustainability in pork production with immunocastration

Aim

Compare

- **Nutrient** (N- and P-) **excretion** per kg pork production
- **Carbon footprint (CFP)** per kg pork production

between

- **Immunocastrates (IC) versus entire males (EM) and barrows (BA)**
- different **management** strategies (diet, housing)
- different country-specific **scenarios** (e.g. other ingredients in feed)

Methods – Trials

2 trials: 1 in Belgium (ILVO) – 1 in Germany (UHOH)
Boars – Barrows – Immunocastrates
Belgium: 8 pens per treatment
UHOH: 12 pens per treatment (feed intake monitored per 2 pens)

In the framework of ERA-net project SUSI: Sustainability in pork with immunocastration

Methods – Trials

Feed composition

	ILVO			UHOH		
	Phase 1	Phase 2	Phase 3	Phase 1	Phase 2	Phase 3
Crude protein, g/kg	160	155	159	175	161	159
P, g/kg	4.4	4.4	3.7	4.6	4.4	4.5
CFP_{feed}, CO2eq/kg	1279	1172	1051	1285	1104	1046
SID LYS, g/kg	9.4	8.6	7.7	10.3	8.9	8.3
NE, MJ/kg	10.1	10.0	10.2			
ME, MJ/kg				13.0	13.0	12.3

Methods – Nitrogen efficiency

N consumed= CP ingested x 0.16

based on FCR and CP levels of diets per phase

N content at start= BW at start x 0.156 x 0.16

based on ILVO trials: 15.6% CP in pigs around 25 kg

N content at slaughter= BW at start x 0.174 x 0.16

based on ILVO trials: 17.4% CP in pigs at slaughter age

N retained= N content at slaughter – N content at start

N efficiency= N retained/N consumed

Methods – Phosphorus efficiency

P consumed= total P ingested

based on FCR and P levels of diets per phase

P content at start= BW at start x 0.00471

based on ILVO trials

P content at slaughter= BW before slaughter x 0.00458

based on ILVO trials

P retained= P content at slaughter – P content at start

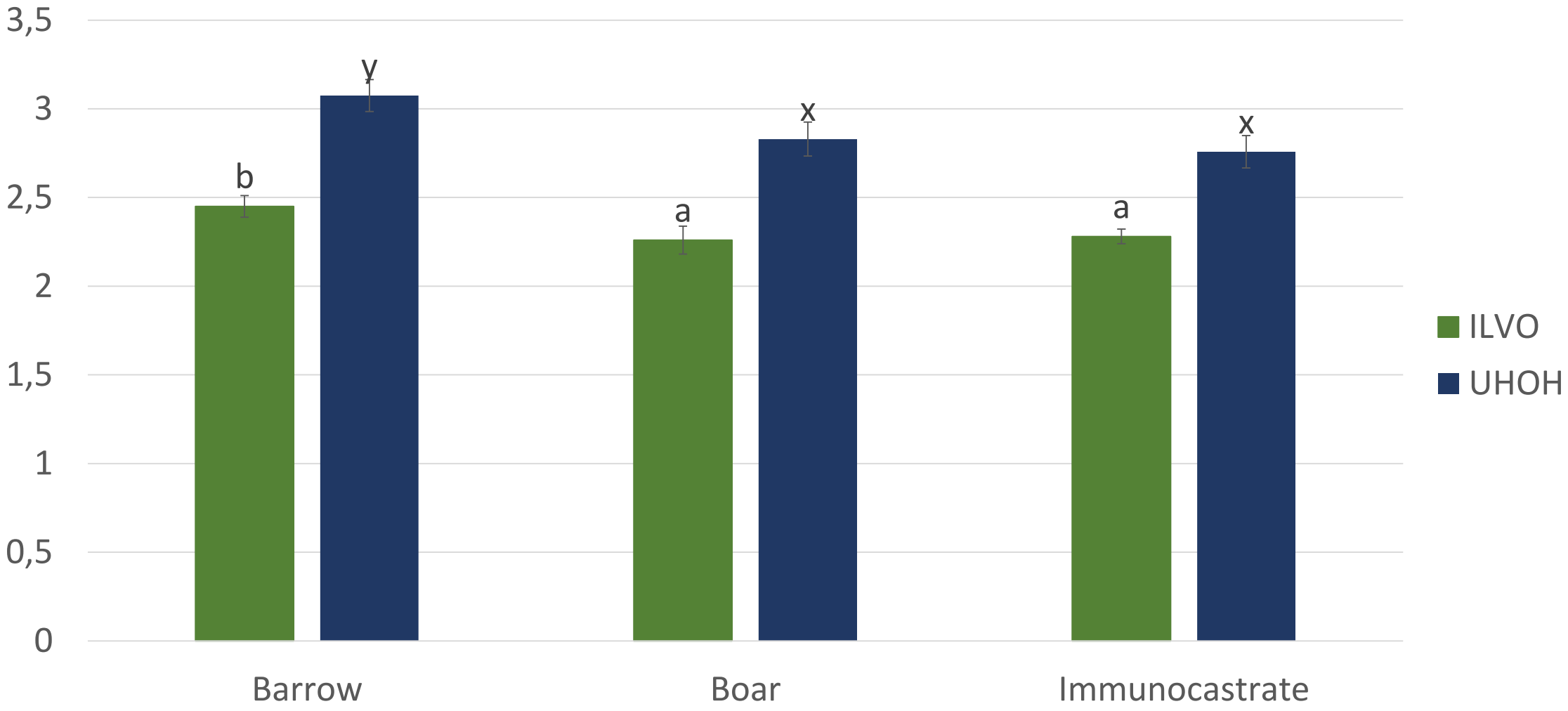
P efficiency= P retained/P consumed

Methods – Carbon footprint (CFP) of the feed intake

1. **CFP_{feed}/kg feed** = Σ ($CFP_{ingredient}$ * feed share)
2. **$CFP_{feed\ intake}$** = CFP_{feed} * feed consumed

Expressed as: $CFP_{feed\ intake}$ per kg BW gain
per kg carcass gain

Results – Feed conversion ratio, g/g



Gender: P<0.001

Trial: P<0.001

Interaction: P=0.048

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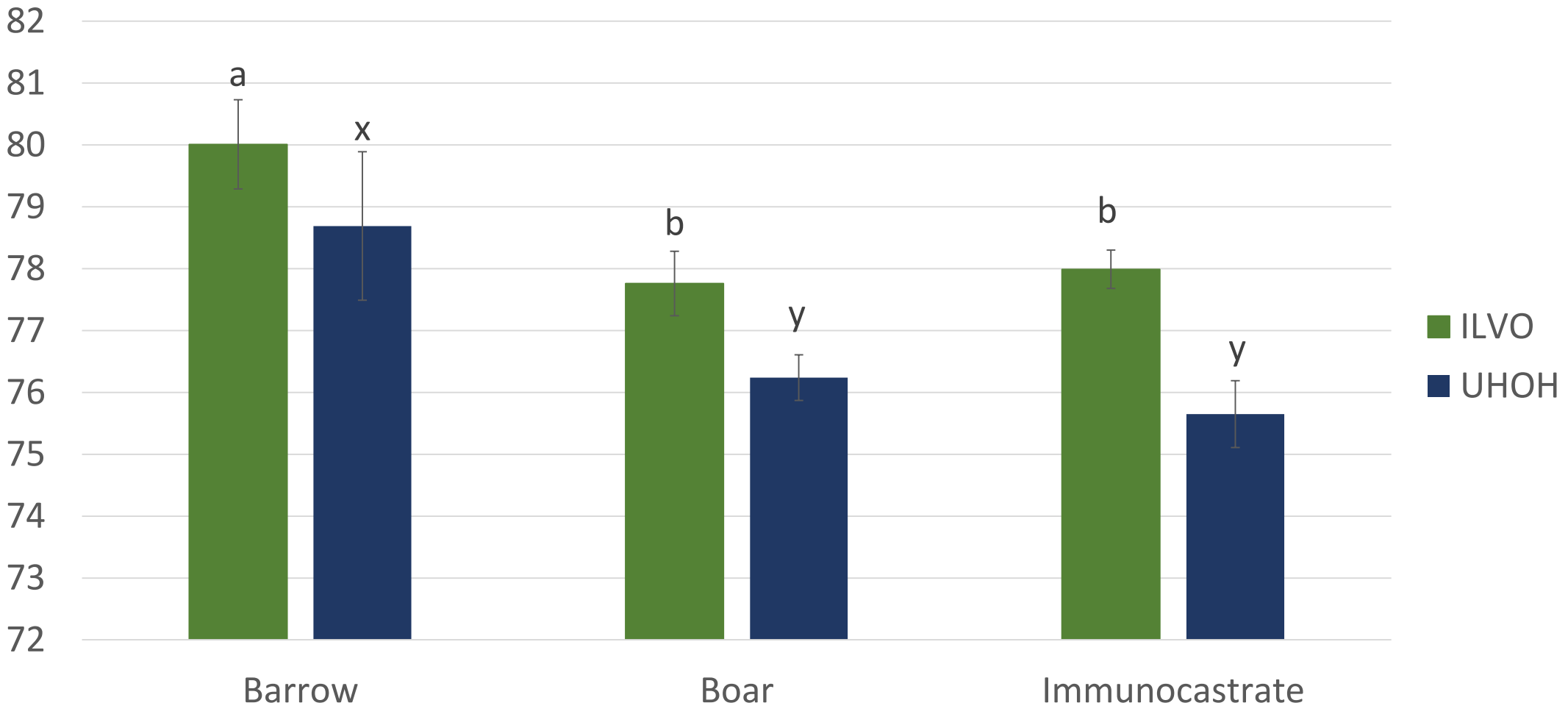
Results – Dressing percentage, %



Gender: P=0.004

Trial: P= <0.001

Interaction: P= 0.128

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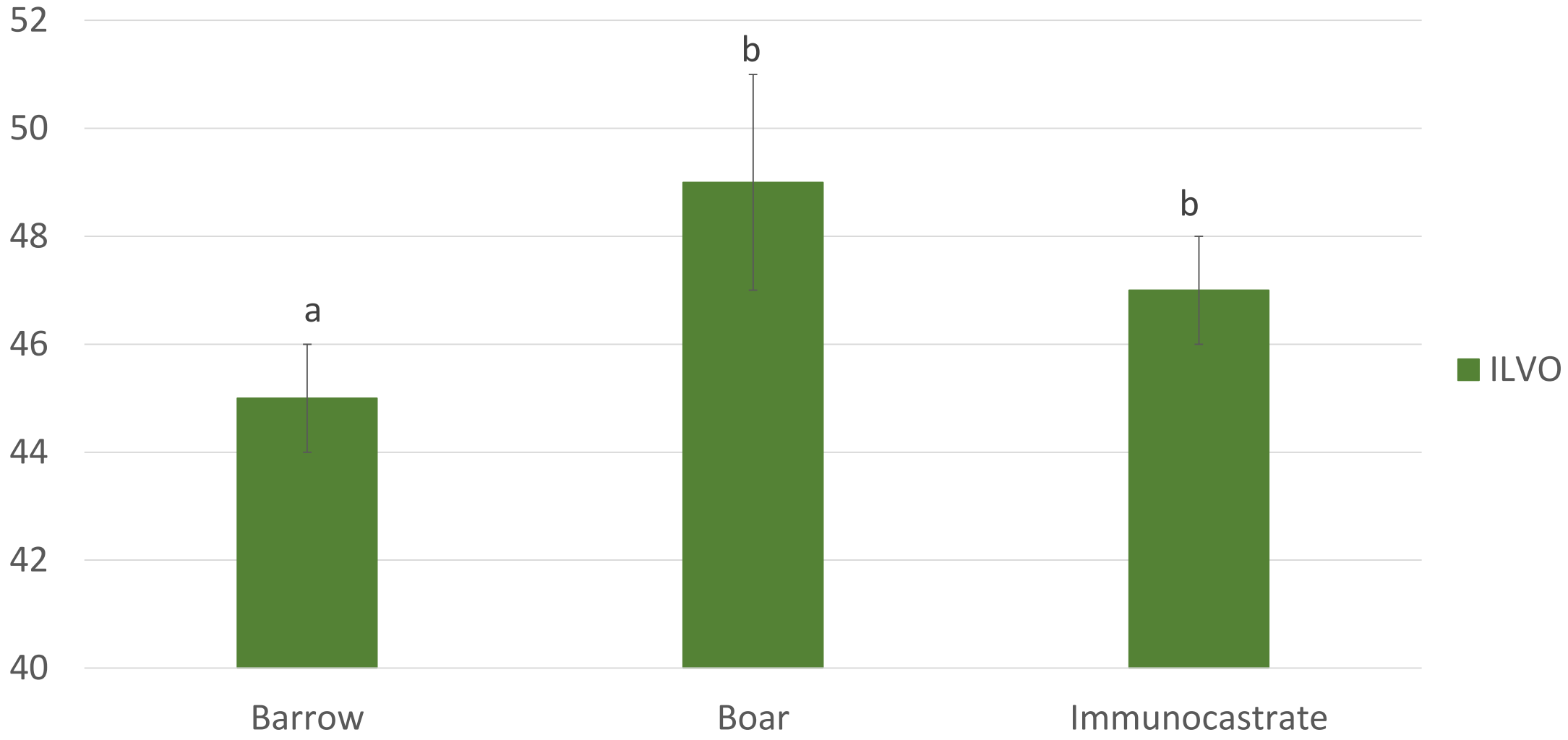
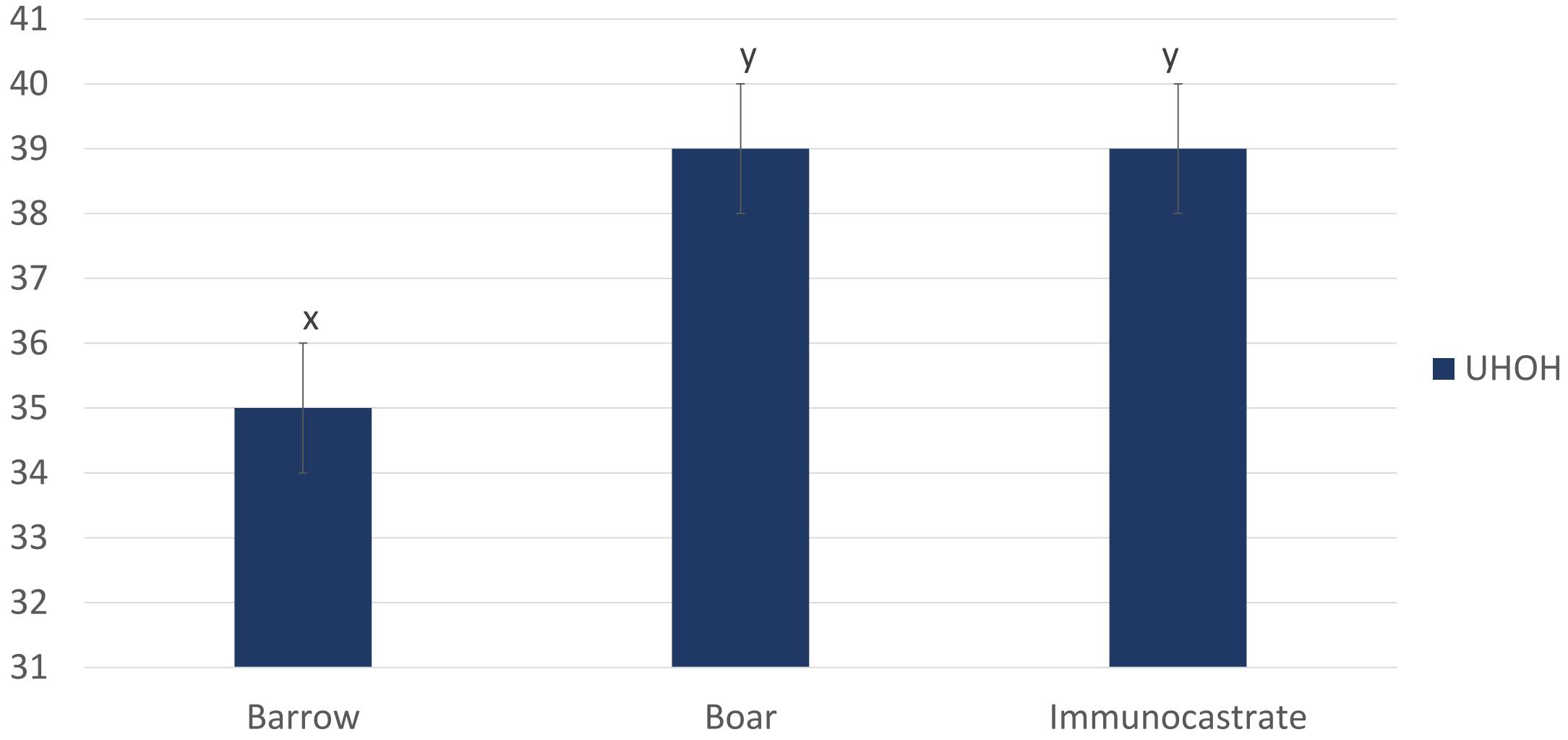
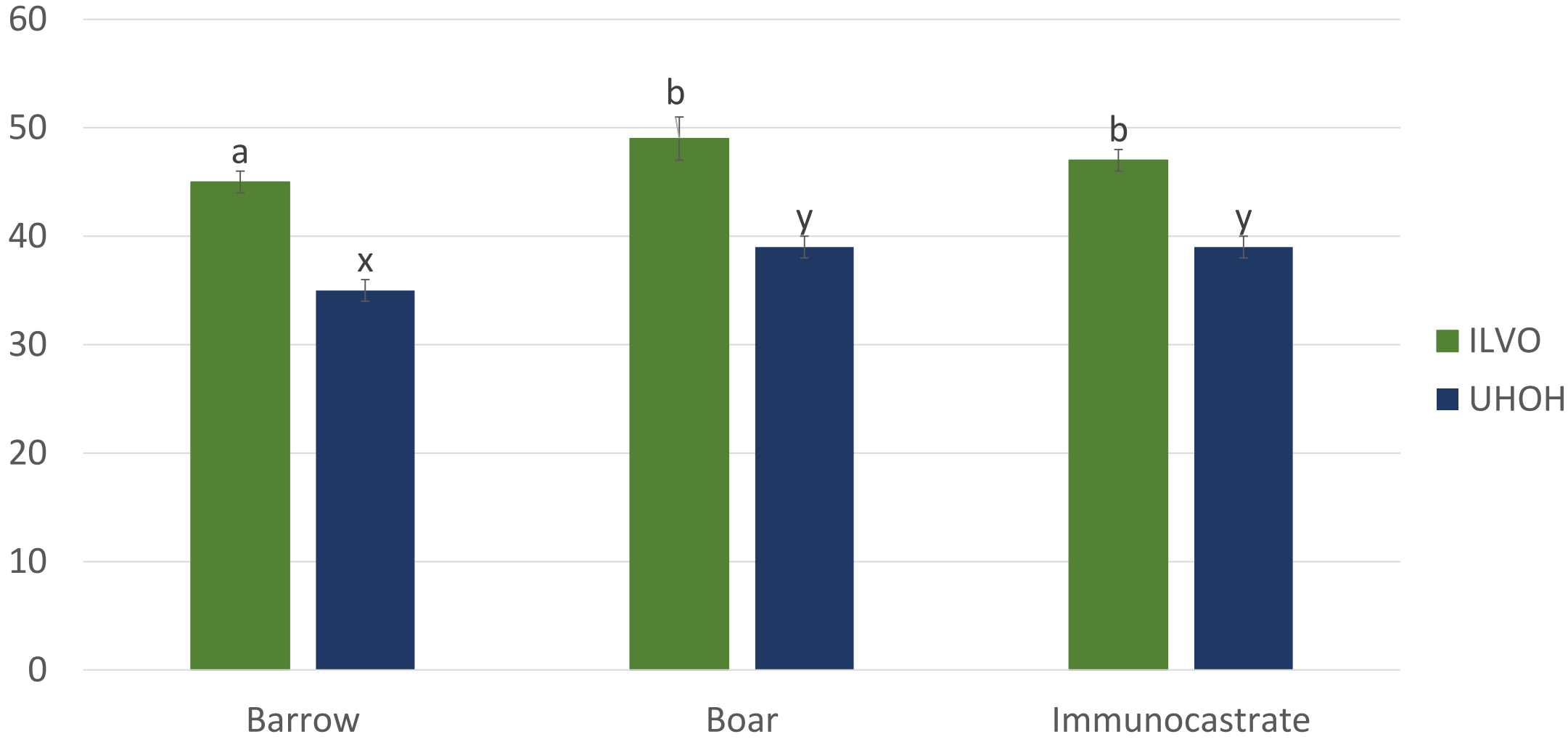
Results – Nitrogen efficiency, %



Results – Nitrogen efficiency, %



Results – Nitrogen efficiency, %



Gender: P=<0.001

Trial: P= <0.001

Interaction: P= 0.038

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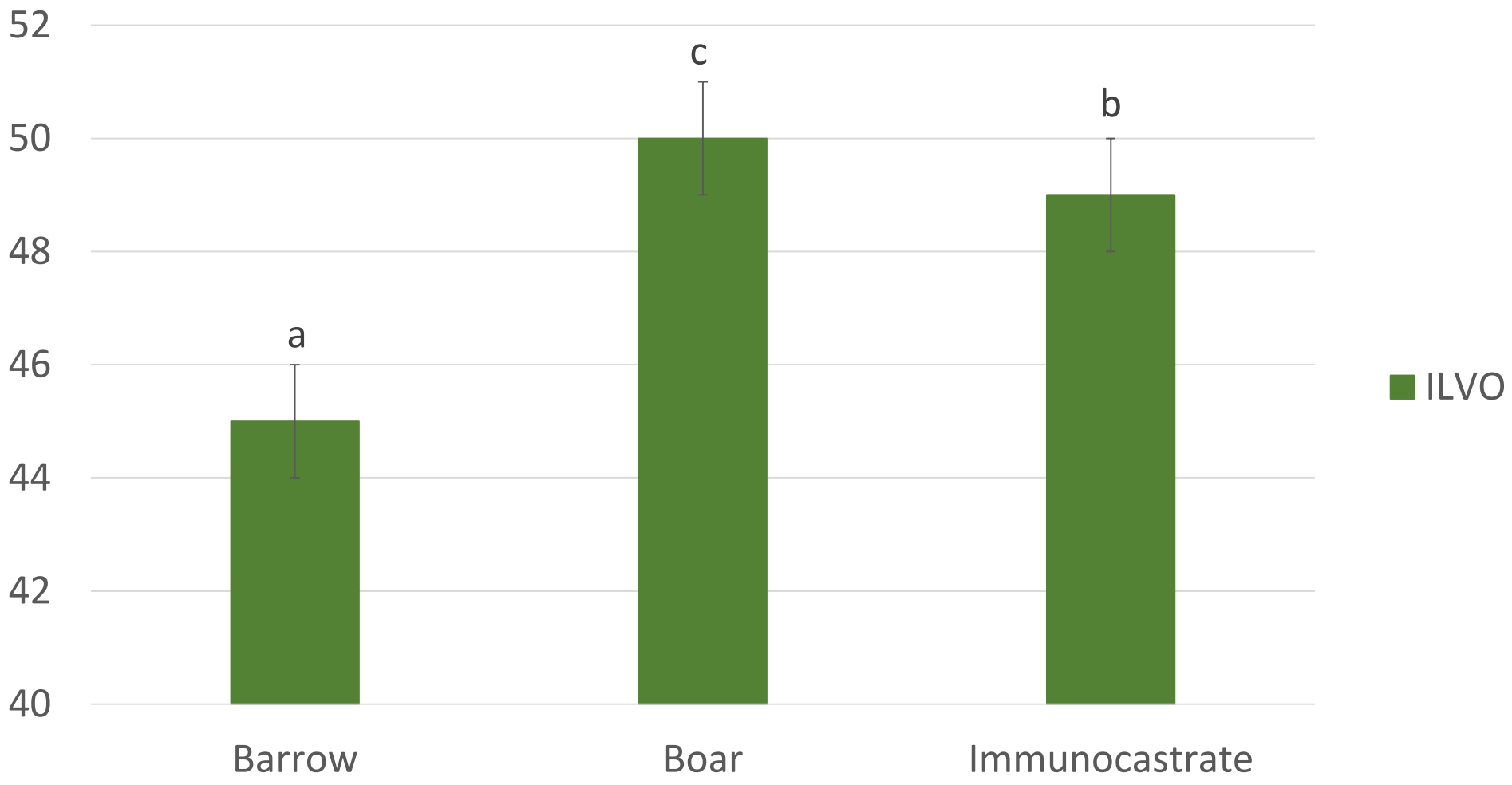
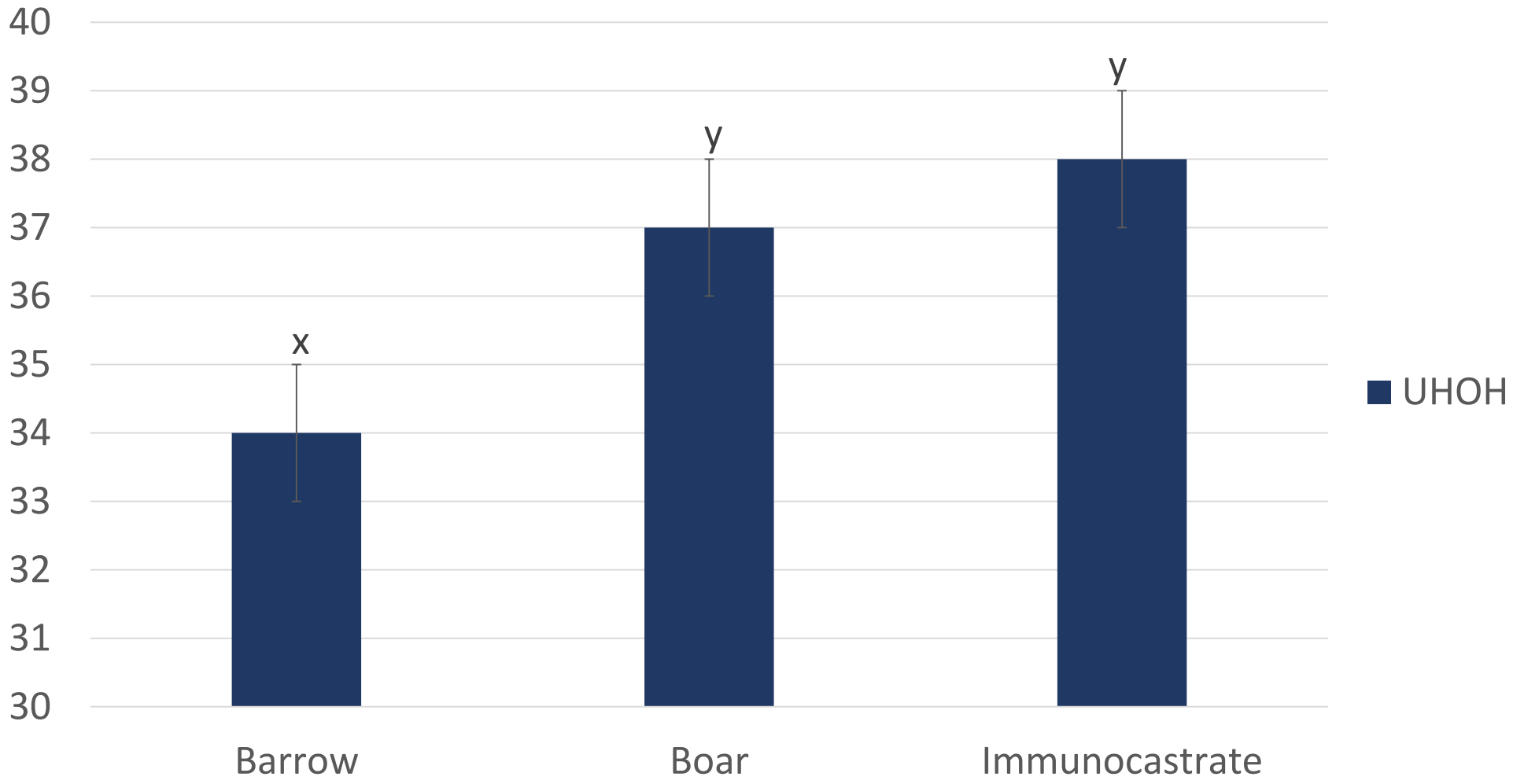
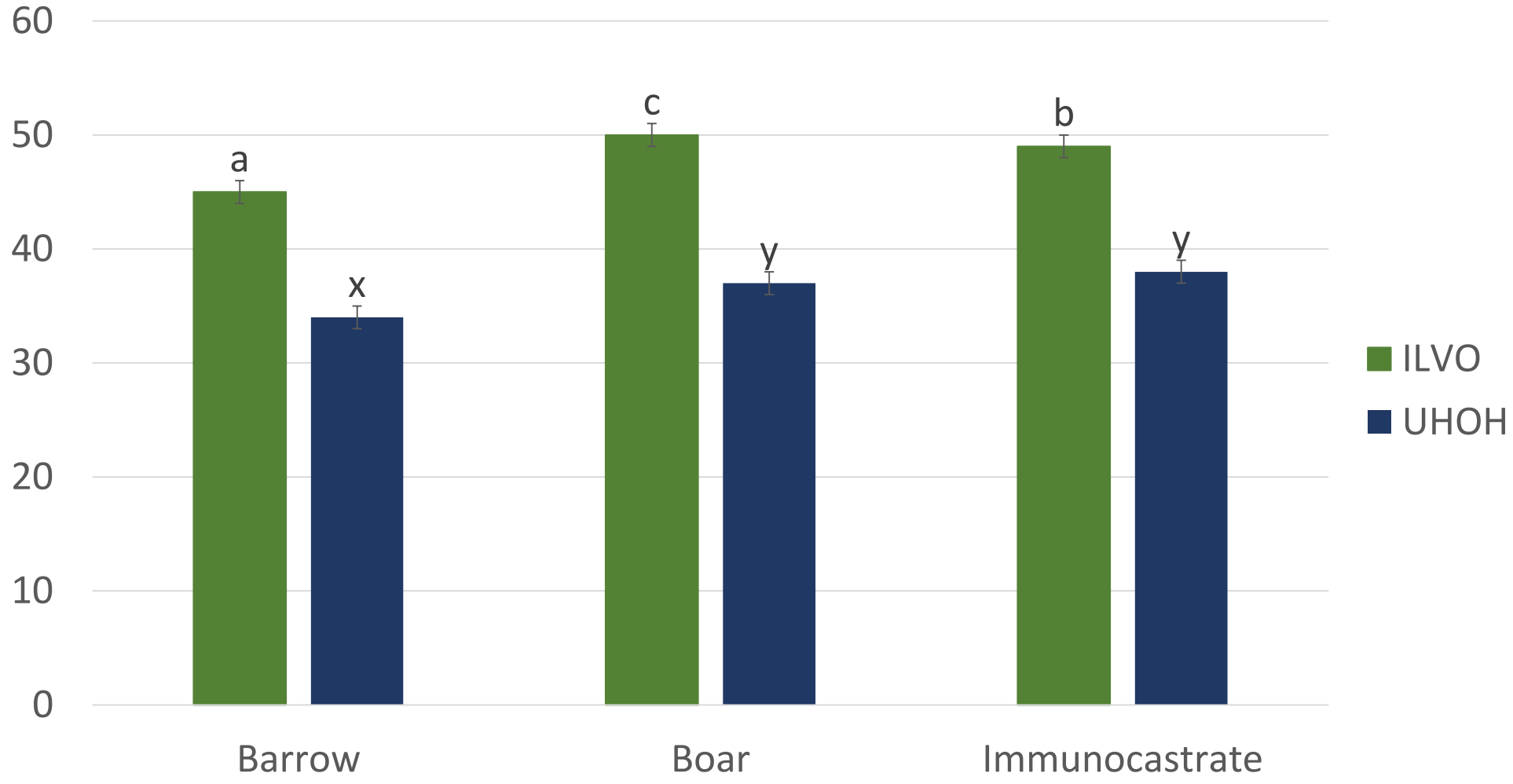
Results – Phosphorus efficiency, %



Results – Phosphorus efficiency, %



Results – Phosphorus efficiency, %



Gender: P=<0.001

Trial: P= <0.001

Interaction: P= 0.021

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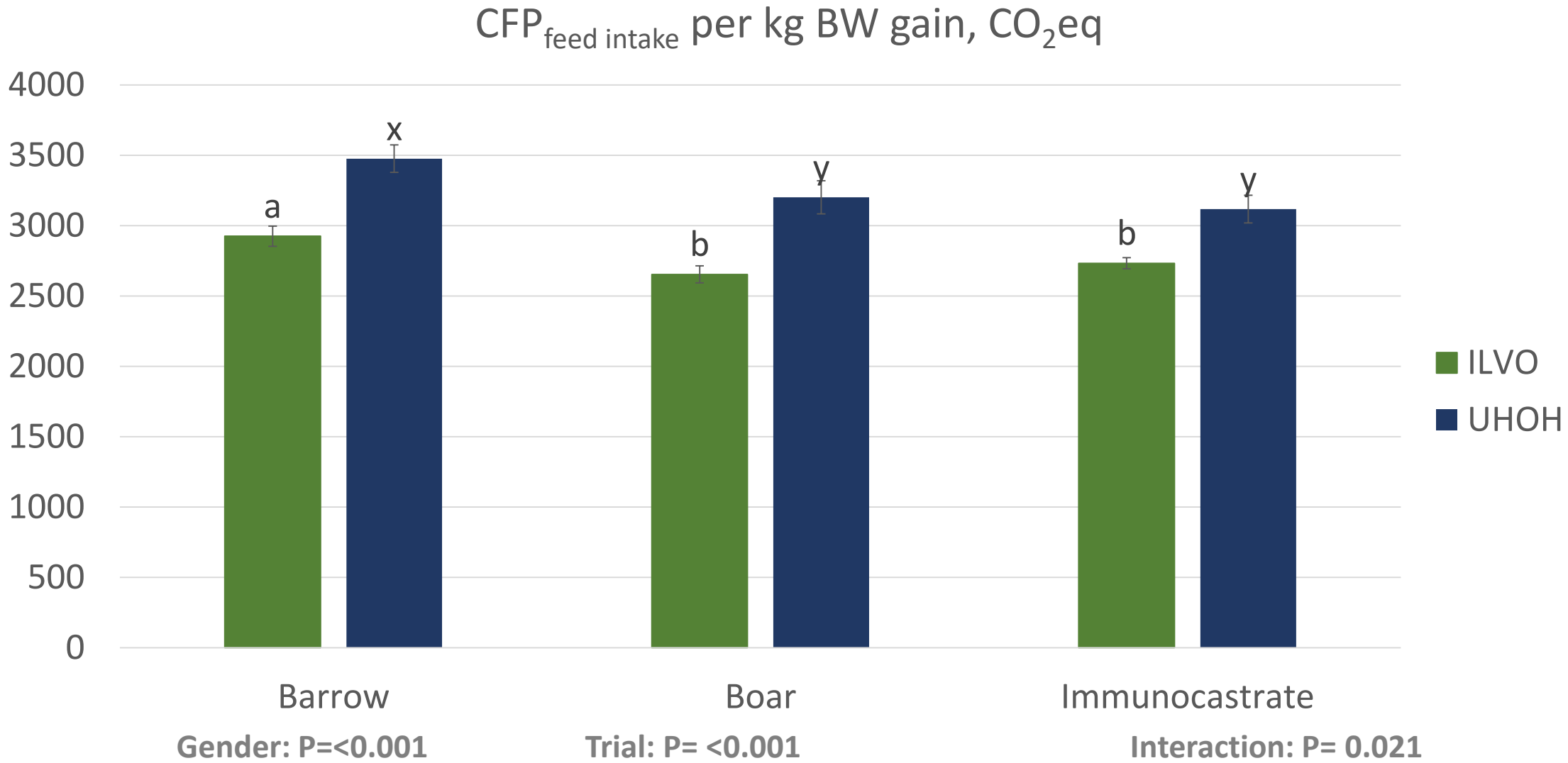
Results – Carbon footprint (CFP) of the feed intake (incl LUC)



Gender: P=<0.001

Trial: P= <0.001

Interaction: P= 0.021

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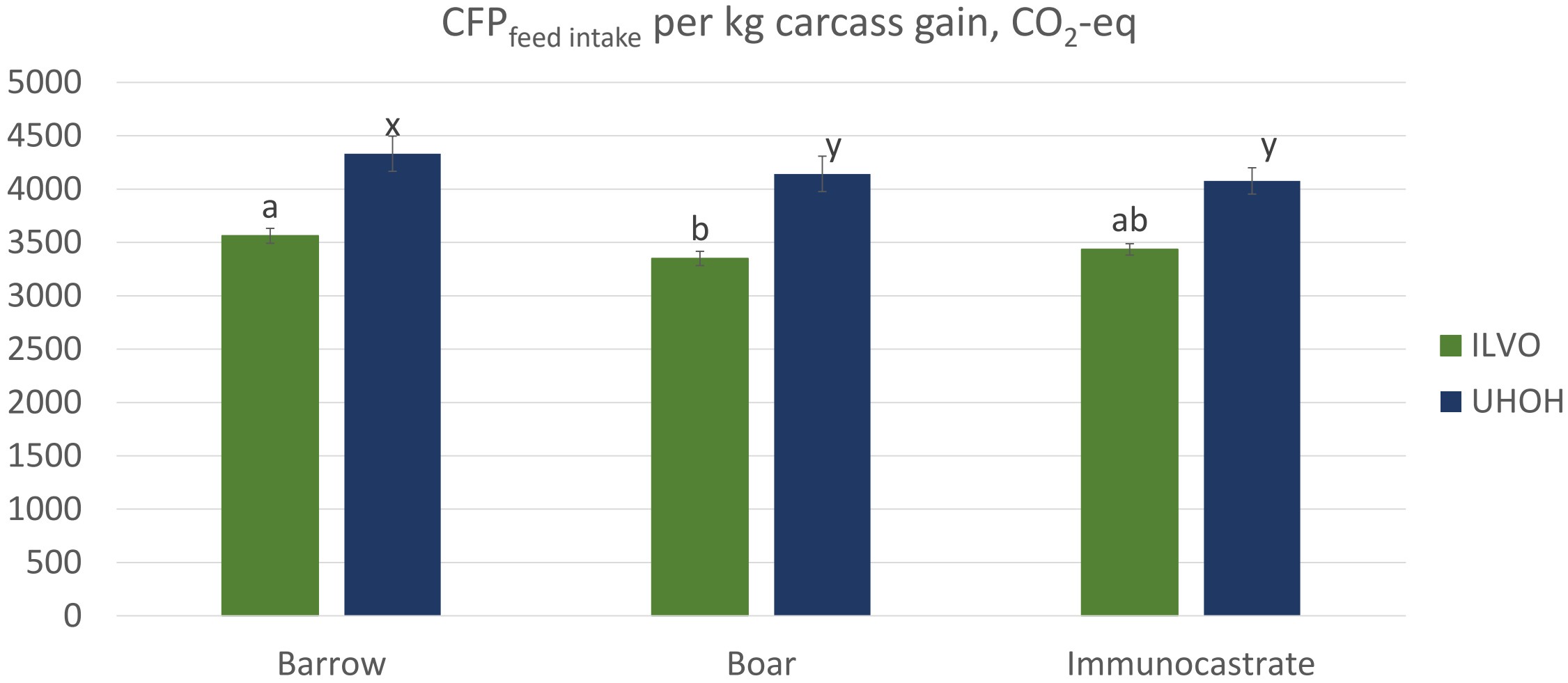
Results – Carbon footprint (CFP) of the feed intake



Gender: P=<0.001

Trial: P= 0.002

Interaction: P= 0.183

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Conclusion

Better feed efficiency of BO and IC results in a lower environmental impact compared to BA

but

differences between trials were larger than differences between sexes

Questions?

FLANDERS INNOVATION & ENTREPRENEURSHIP
Flanders State of the Art

Grant: 160272

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