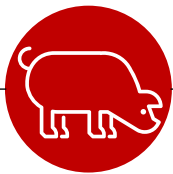


Sire selection for infrared prediction of ham weight-loss during dry-curing affects green ham traits, and measured ham weight-loss in heavy pigs

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INTRODUCTION

- Dry-cured ham: globally valued for unique flavour and complex aroma
- Key processing factor: achieving optimal dehydration level
- Weight loss (WL) impacts:
 - Yield of marketable product
 - Salt concentration
 - Activity of proteolytic enzymes (crucial for flavour and texture development)





INTRODUCTION

- Ham WL during first 7 days of salting used as an indicator trait due to the high genetic correlation with final WL

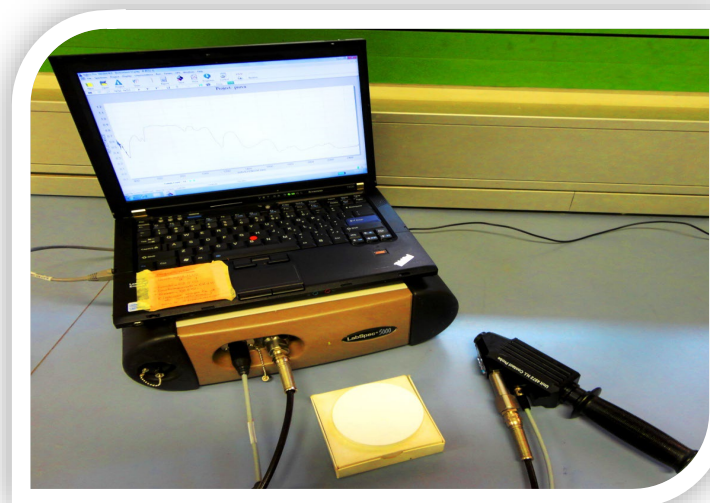


There are 2 ways of selecting pigs based on WLpred



- The use of visible-near infrared (VIS-NIR) spectroscopy, have allowed for more efficient and accurate predictions of WL

$$R^2 = 0.62$$





OBJECTIVE



To assess the impact of selective breeding for predicted weight loss (WLpred) on:

- carcass traits,
- green ham quality traits,
- actual weight loss measured after 18 months of dry-curing in a controlled selection experiment.

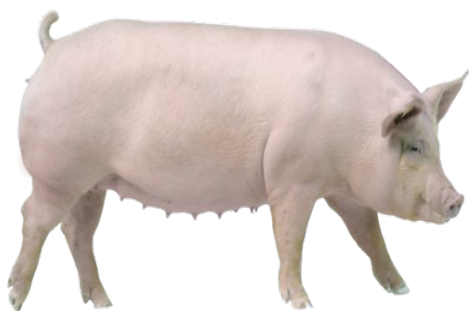


MATERIALS AND METHODS

Selection of sires and creation of the experimental population:

70 sires from Goland C21 line were divided into 2 groups:

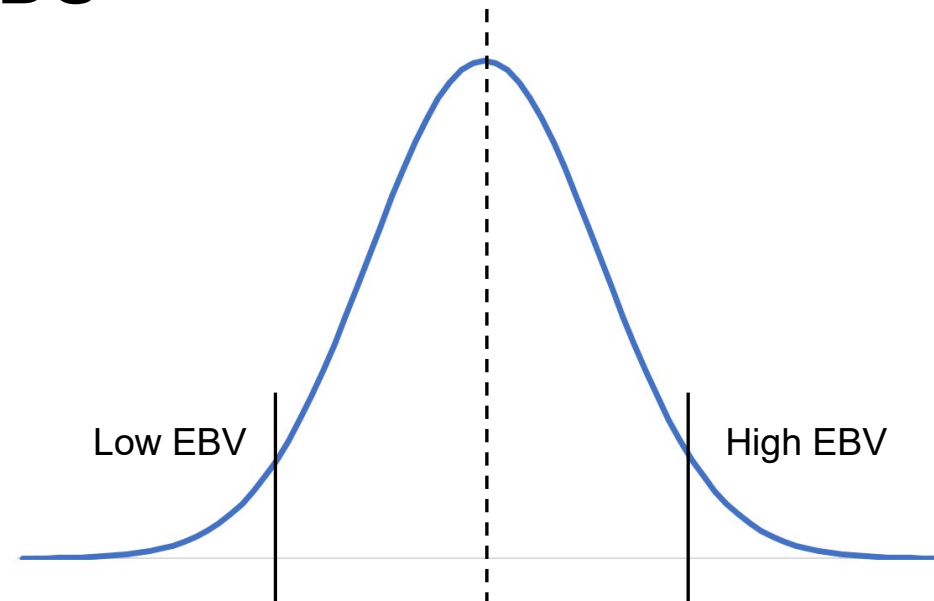
- **Bottom Sires Group:** 15 sires with the lowest EBV for WLpred
- **Top Sires Group:** 15 sires with the highest EBV for WLpred
- Evaluated EBV for WLpred using BLUPF90 software



PIC Camborough® sows



Goland C21 Boar



● Mating and Offspring:

- Sires mated with PIC Camborough® sows
- Produced 345 F2 crossbred piglets
- Piglets raised under consistent conditions and were slaughtered at 9 months of age
- Average Slaughter Weight: 166.1 ± 15.9 kg



MATERIALS AND METHODS

● Carcass Traits:

- Lean Meat Content: Estimated using Fat O-Meater
- Carcass Weight: Recorded for each pig
- Trimmed Ham Weight: Measured after slaughter
- Subcutaneous Fat Depth: Assessed using ultrasound (Aloka SSD 500) and calliper

● Green Ham Traits:

- Roundness, marbling, colour and veining: Scored by trained experts

● Fatty Acid Composition Predictions:

- VIS-NIR Spectroscopy: Applied to green hams
- Parameters Predicted: C18:0, C18:2n-6 (fatty acids), PUFA, MUFA to PUFA ratio

● Dynamics of WL

- Modelled by the generalized VBGF
- First derivative of VBGF model was used





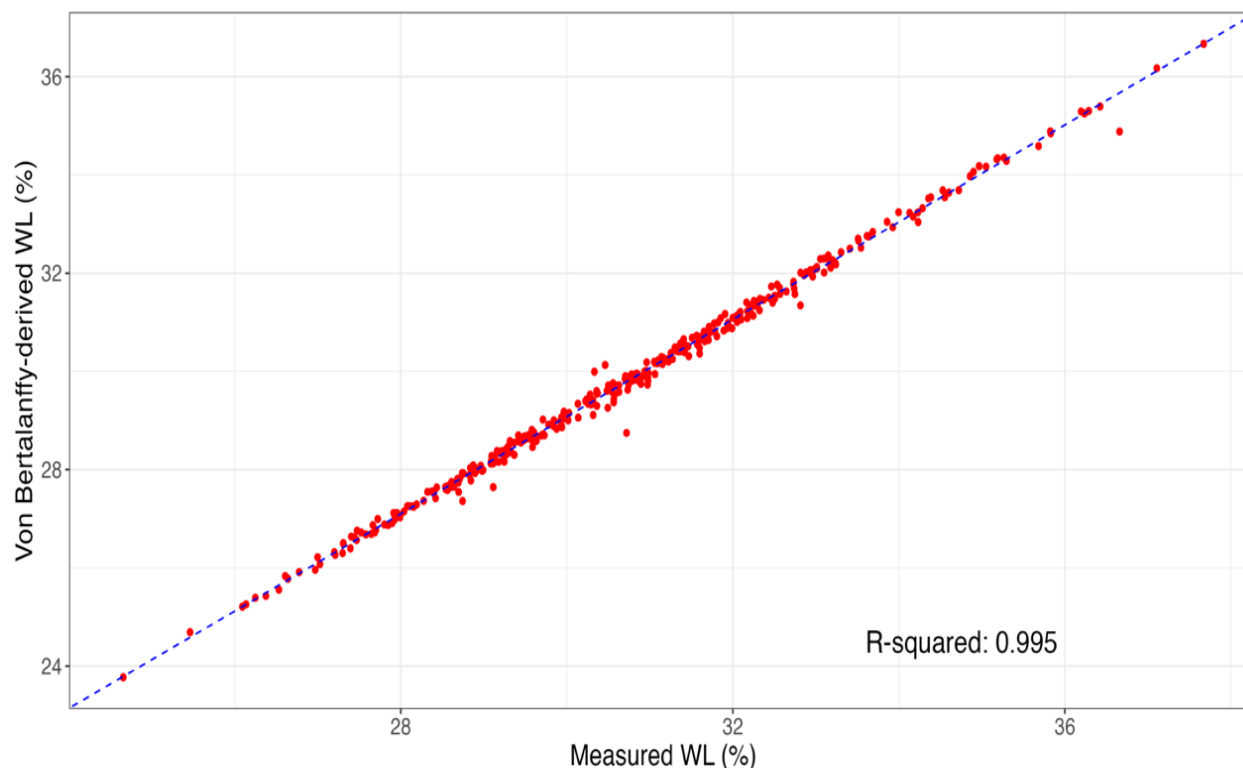
MATERIALS AND METHODS

Modelling of the dynamics of ham weight loss and statistical analyses

We have tested 6 non-linear models:

Weibull, generalized von Bertalanffy (VBGF), 3-parameter Beta, U-Richards, U-Gompertz, Logistic

- Comparison Criteria: Goodness of fit, R-squared values and RMSE (Root Mean Square Error)
- Top-Performing Models:
 - Weibull and generalized VBGF (R-squared > 0.995, RMSE between 0.83% and 0.87%)
 - The use of the generalized von Bertalanffy (VBGF) model was preferred for further analyses due to its clear biological interpretation and excellent goodness of fit.





RESULTS AND DISCUSSION

- Individual WL ranged from 21.60% to 34.68% at 12 months and from 24.66% to 39.48% at 18 months.

Ham weight loss, %	Top sires	Bottom sires	SE
7 days	2.37 ± 0.04	2.53 ± 0.04	0.005
12 months	27.9 ± 0.15	28.6 ± 0.16	0.002
18 months	29.5 ± 0.15	30.3 ± 0.17	0.002



RESULTS AND DISCUSSION

Trait	Top sires	Bottom sires	p-value
Carcass traits			
Carcass weight (kg)	141 ± 1.00	137 ± 1.00	0.04
Lean meat percentage (%)	54.0 ± 0.15	53.83 ± 0.17	0.50
Weight of trimmed ham (kg)	14.0 ± 0.09	13.7 ± 0.10	0.03
Hams (% carcass weight)	19.8 ± 0.05	19.9 ± 0.05	0.61
Ham quality scores			
Fat depth	0.85 ± 0.11	0.13 ± 0.13	<0.001
Marbling	1.08 ± 0.06	0.61 ± 0.07	<0.001
Roundness	1.86 ± 0.07	1.77 ± 0.07	0.32
Veining	0.9 ± 0.07	1.1 ± 0.08	0.03
Color	-0.30 ± 0.08	-0.53 ± 0.09	0.07
Hemorrhages	0.27 ± 0.04	0.17 ± 0.05	0.11

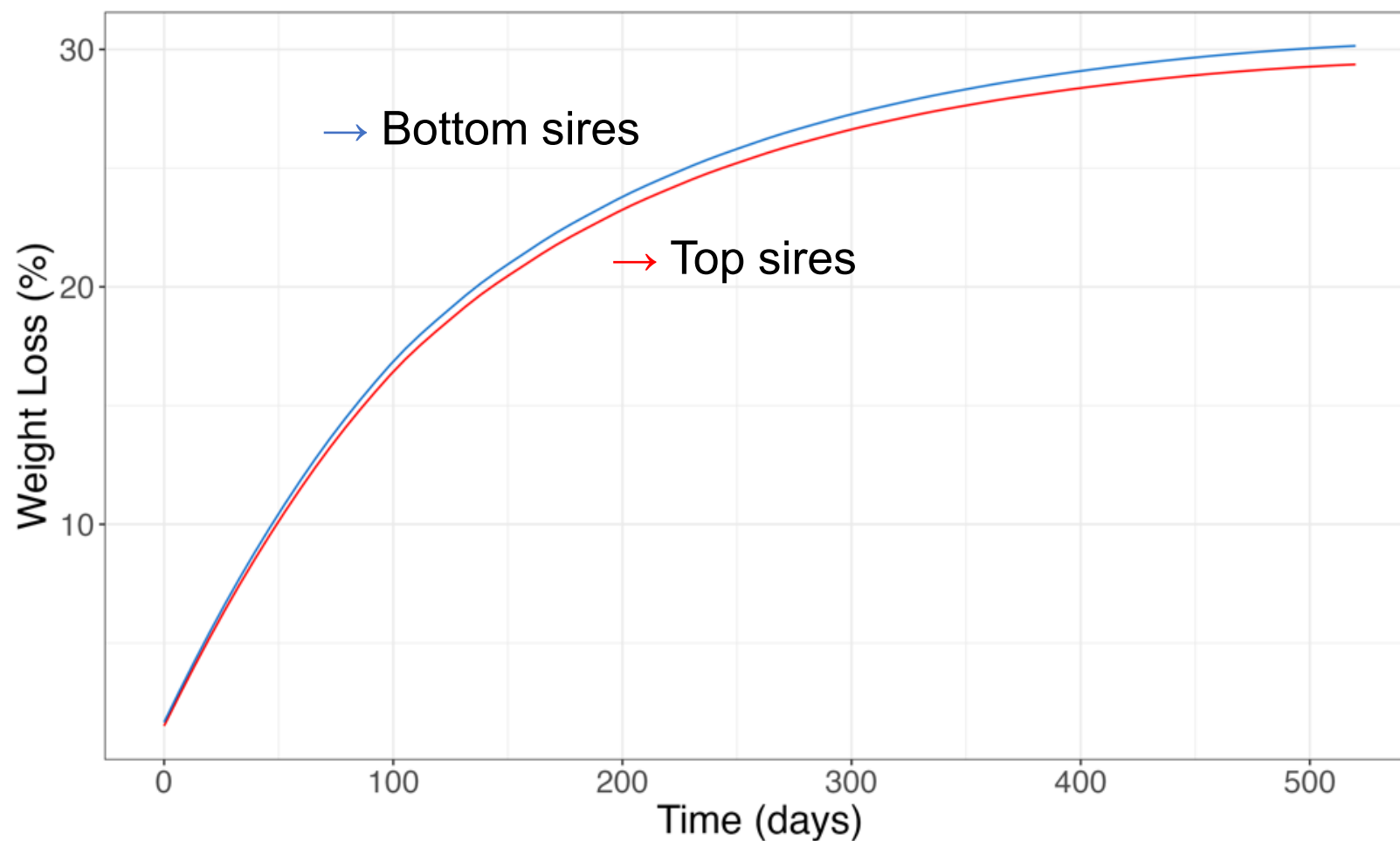


RESULTS AND DISCUSSION

Trait	Top sires	Bottom sires	p-value
Ham subcutaneous fat depth in proximity of			
<i>biceps femoris</i> (mm)	34.5 ± 0.47	33.0 ± 0.50	0.03
<i>semimembranosus</i> (mm)	5.90 ± 0.07	6.00 ± 0.07	0.76
Ham fat quality			
Iodine number	66.4 ± 0.28	66.9 ± 0.30	0.29
C18:0 (g/100 g fat)	13.36 ± 0.08	13.25 ± 0.08	0.36
C18:2n-6 (g/100 g fat)	12.21 ± 0.16	12.43 ± 0.17	0.36
MUFA/PUFA	3.34 ± 0.05	3.31 ± 0.05	0.59
PUFA (g/100 g fat)	14.38 ± 0.18	14.63 ± 0.20	0.36

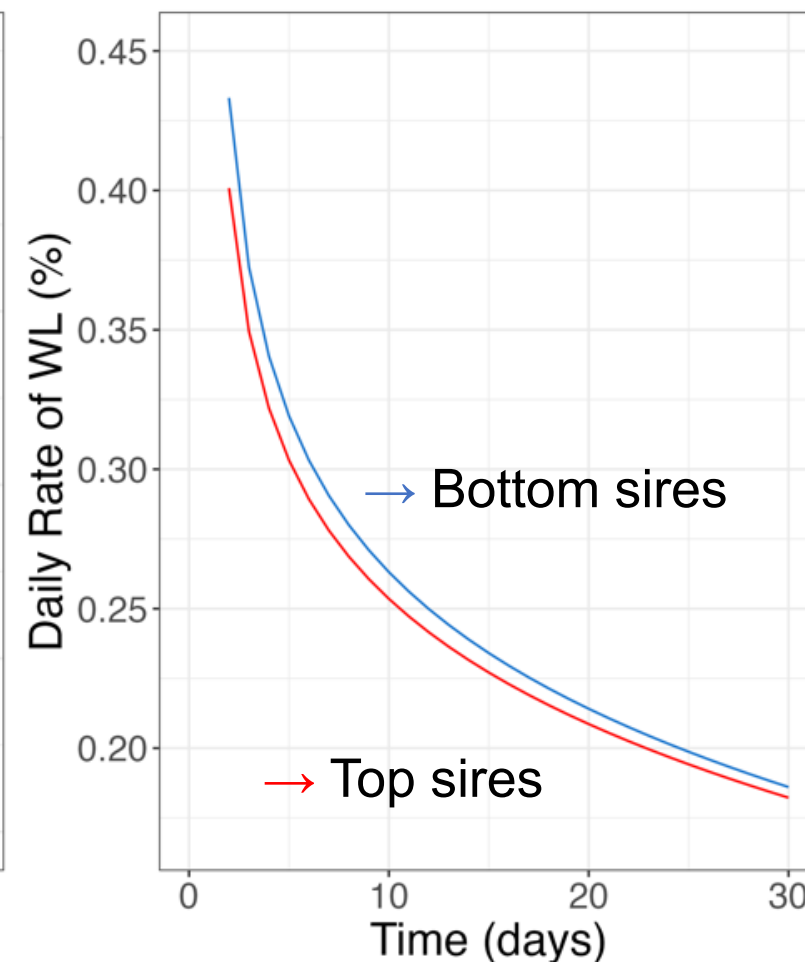
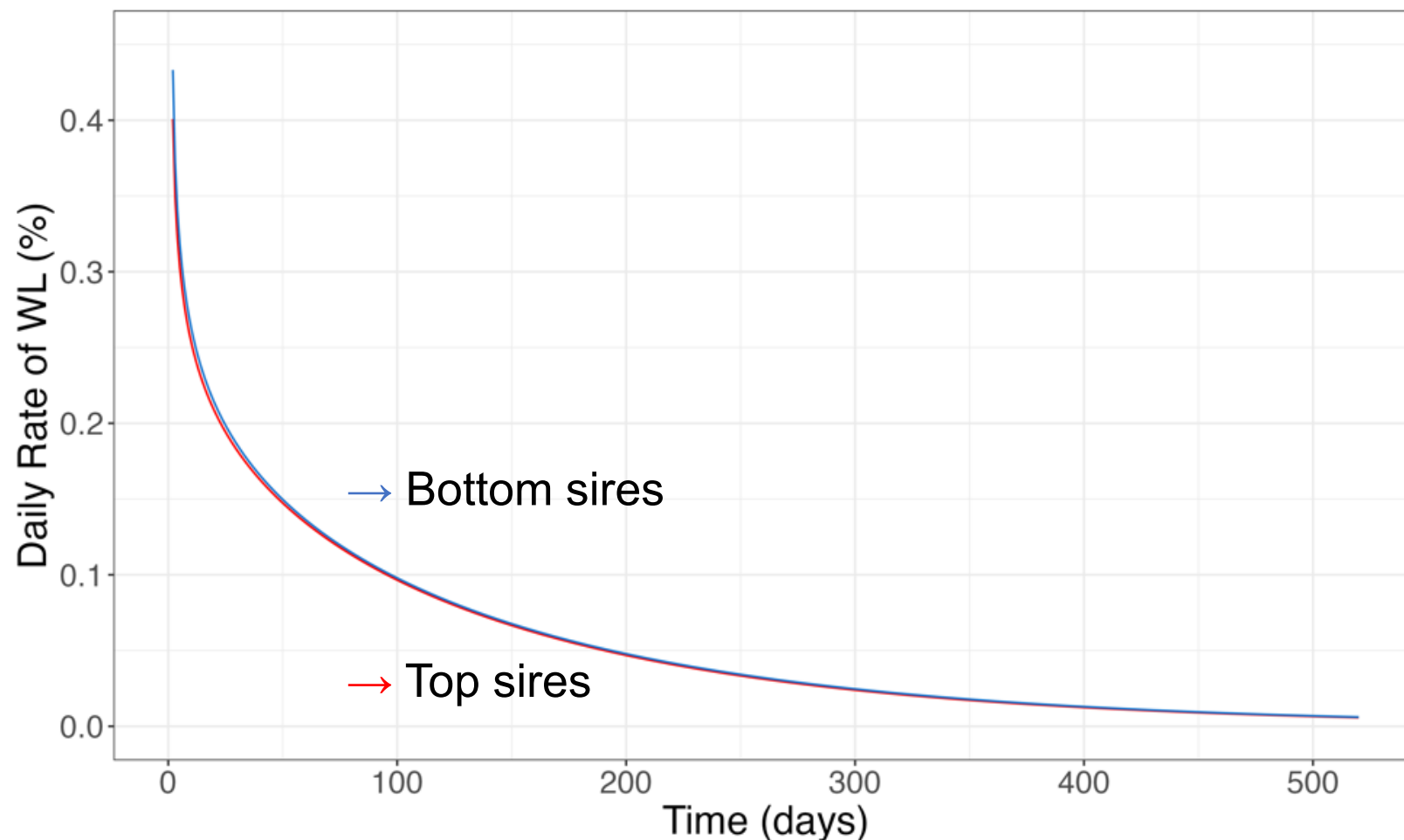


RESULTS AND DISCUSSION





RESULTS AND DISCUSSION





CONCLUSION

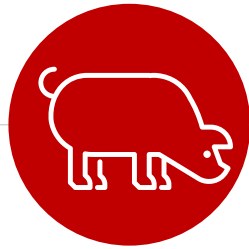
- Purebred sires with Top EBV for infrared-predicted WL resulted in progeny with improved ham quality;
- Expected a reduction in WL; achieved significant reductions at both 12 and 18 months in Top sires;
- Improved carcass traits, such as higher carcass weight and better marbling, observed in top sire progeny;
- Positive Results:
 - Differences in WL of the F2 progeny were significant between sire groups, despite the limitations of this study,
 - Enhanced ham quality through reduced dehydration and better fat deposition.





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Thanks!

Any questions?



SUPPLEMENTARY SLIDE

Diet and composition of the fodder

● 35 to 100 kg BW:

- Ad libitum diet:
- 15.9% CP, 2.5% lipids, 1% Lys, 0.7% Met
- 14.8 MJ/kg ME as fed

● 100 kg BW onwards:

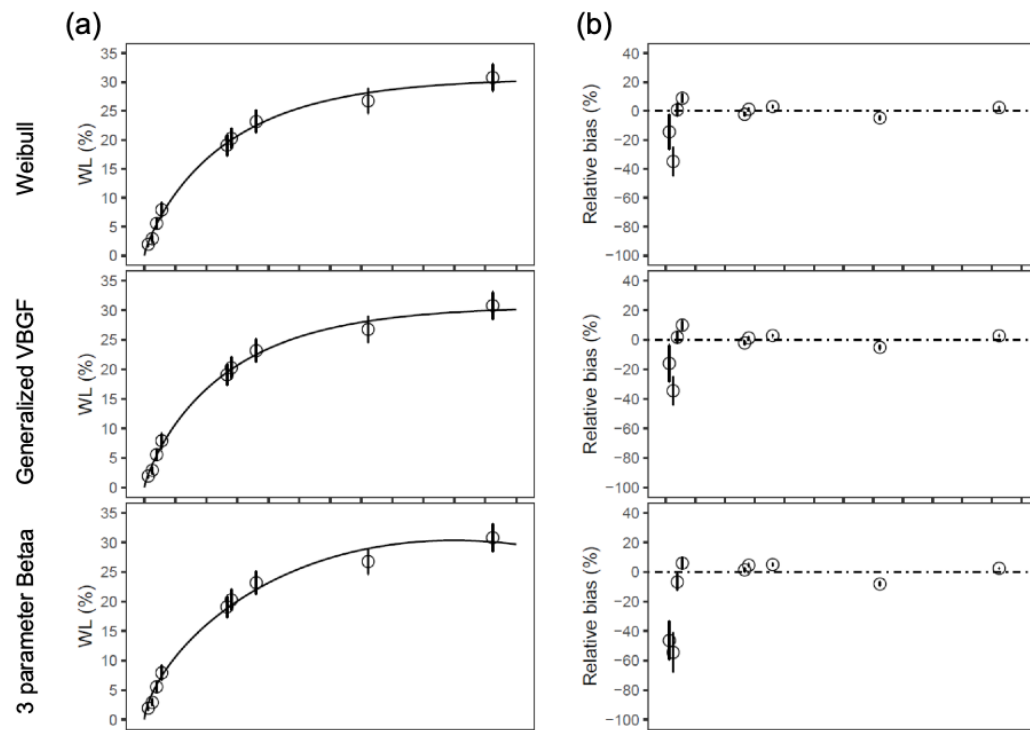
- Restricted diet:
- 11.7% CP, 3.0% lipids, 0.7% Lys, 0.2% Met
- 12.6 MJ/kg ME as fed

Ingredient (%)	35-100 kg BW	> 100 kg BW
Corn grain	49.54	47.97
Wheat grain	22	22
Wheat middlings	1	17
Wheat bran	-	5.5
Barley grain	6.0	1.4
Dehulled soybean meal	17.6	3.4
Calcium carbonate	1.11	1.12
Sodium chloride	0.60	0.39
Sodium bicarbonate	-	0.20
Monocalcium phosphate 22.7%	0.65	0.38
Vitamin and mineral premix ¹	0.30	0.19
Choline, liquid, 75%	0.05	0.01
Methionine, liquid, 88%	0.50	-
L-Lysine	0.48	0.35
L-Threonine	0.14	0.08
L-Tryptophan	0.02	0.01
L-Valine	0.01	-

¹ Providing per kilogram of feed: vitamin A, 8000 IU; vitamin D3, 1200 IU; vitamin E, 8 mg; vitamin B7, 0.08 mg; vitamin B12, 0.012 mg; niacin, 16.0 mg; biotin, 8 mg; iron, 170 mg; zinc, 117 mg; copper, 14 mg; cobalt, 0.11 mg; iodine, 0.06 mg; manganese, 65 mg; magnesium, 0.14 mg; selenium 10 mg.



SUPPLEMENTARY SLIDE



Models	Main dataset (n = 345)				
	R^2		RMSE		Mean
	Mean $\pm$ SD	Q0.05	Mean $\pm$ SD	Q0.95	
Weibull	0.9959 $\pm$ 0.00124	0.9940	0.8267 $\pm$ 0.10750	0.9804	0.9968
Generalized von Bertalanffy	0.9954 $\pm$ 0.00128	0.9934	0.8660 $\pm$ 0.11171	1.0281	0.9966
3-parameter Beta	0.9905 $\pm$ 0.00199	0.9875	1.2749 $\pm$ 0.11031	1.4309	0.9934
U-Richards	0.9812 $\pm$ 0.00356	0.9762	1.9208 $\pm$ 0.27126	2.3258	0.9836
U-Gompertz	0.9811 $\pm$ 0.00331	0.9762	1.7878 $\pm$ 0.24144	2.1516	0.9834
Logistic	0.9738 $\pm$ 0.00385	0.9683	2.1079 $\pm$ 0.26106	2.5043	0.9767