Impact of genetics and feeding on loin marbling levels of Canadian hogs

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Background

캐나다 돼지고기
The Healthy Choice

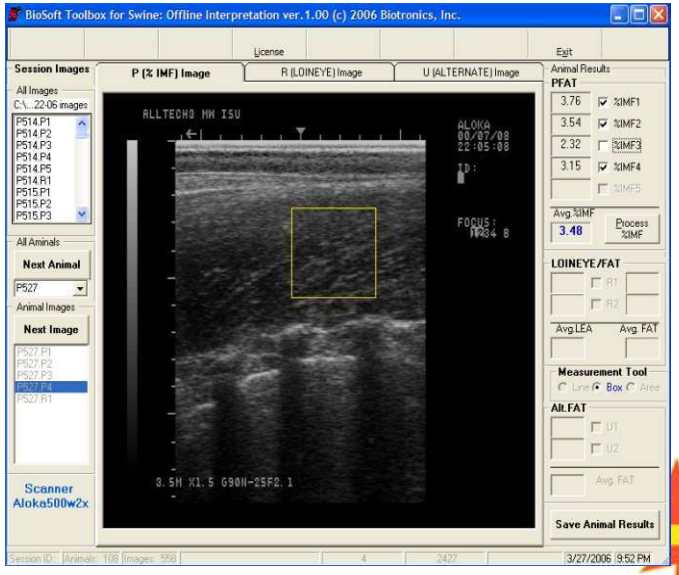
- Canada exports 2/3 of its pork production (~3B$ market)
  - 1st market in volume: USA
  - 1st market in $ value: Japan

(Canada Pork International, 2013)

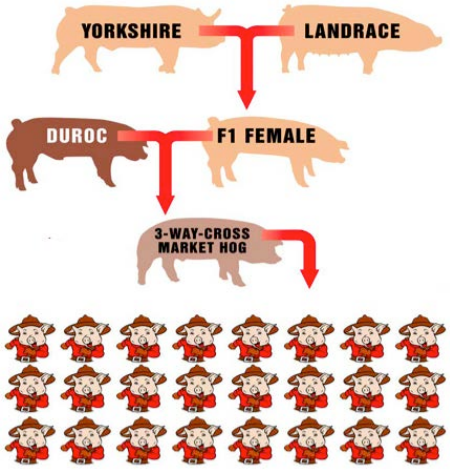
- Value-added markets such as Japan and Korea have specific meat quality requirements (safety, colour, marbling)
- New requirements on domestic markets

Scanning for loin IMF in live pigs

- Selection against carcass fat over the last decades lead to a slow decrease in loin intramuscular fat (IMF)
- Need for ways to measure and monitor marbling levels
- 2009: IMF scanning on live pigs included in the Canadian training and certification program for swine technicians (methodology and results presented at 9WCGALP and EAAP2011)



Use of live IMF
in the Canadian Swine Improvement Program



- In 2012, about 30% of Duroc pigs evaluated under the Canadian Swine Improvement Program were scanned for live IMF
- Breeding values for live IMF available since 2011
- Duroc AI boars with IMF EBVs can be used:
  - In breeding farms: selection on IMF
  - In commercial farms: tailoring of IMF levels in crossbred progeny

Commercial trials

- Objective

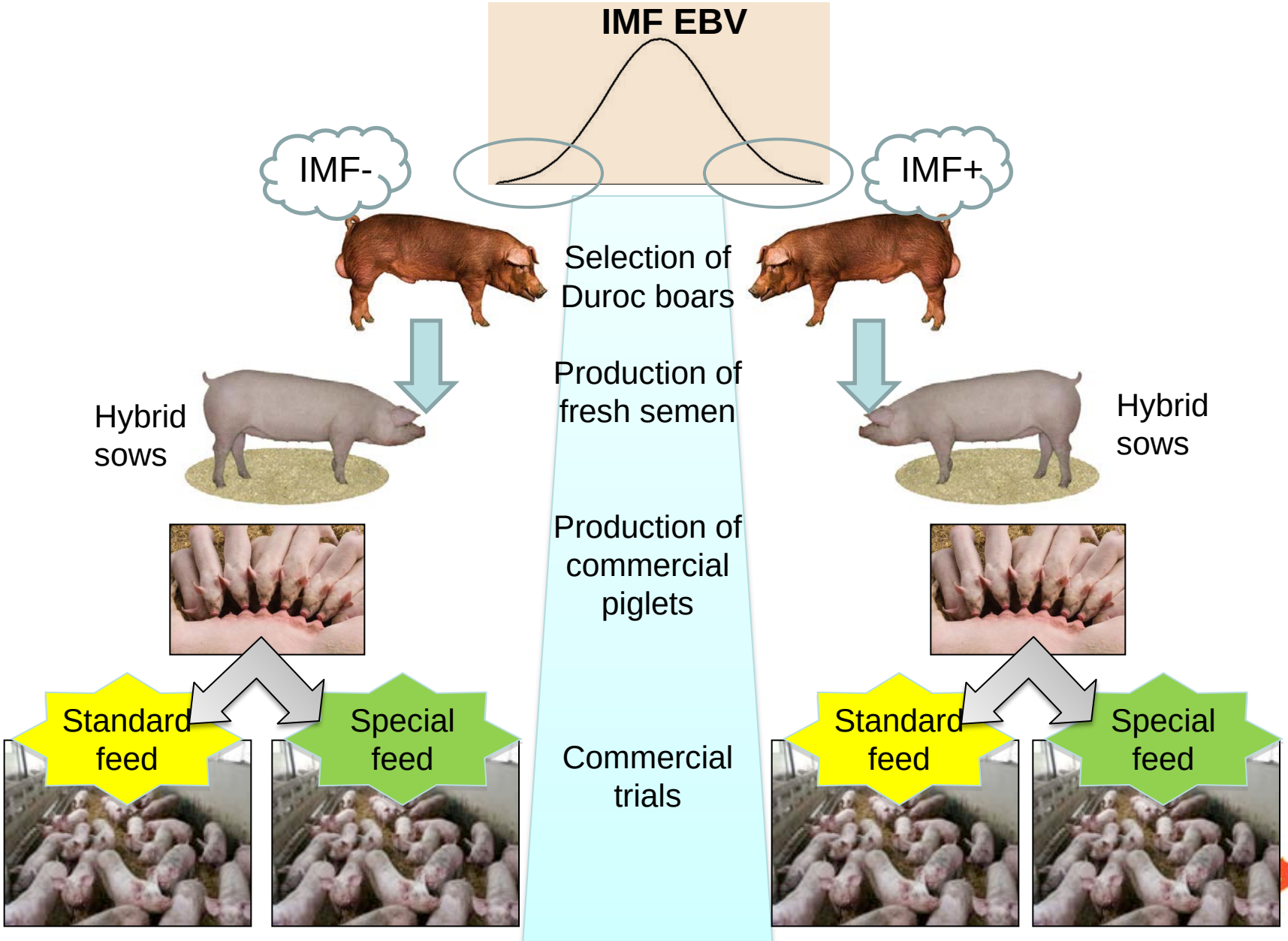
Explore the respective effects of genetics and management (feeding) on marbling levels of Canadian commercial hogs

2 trials : Western Canada / Eastern Canada

COMMERCIAL TRIALS

	Western Trial	Eastern Trial
Location	HyLife Reasearch Barn Manitoba	Deschambault Test Station Quebec
Test	June 2011-September 2011 1,000 pigs (336 tracked individually)	December 2011 – April 2012 350 pigs (all tracked individually)
Carcass evaluation	Sept-Oct 2011 180 hogs	April-May 2012 350 hogs
Sensory analysis	80 loins	80 loins

Commercial trials – 2*2 design



Boars

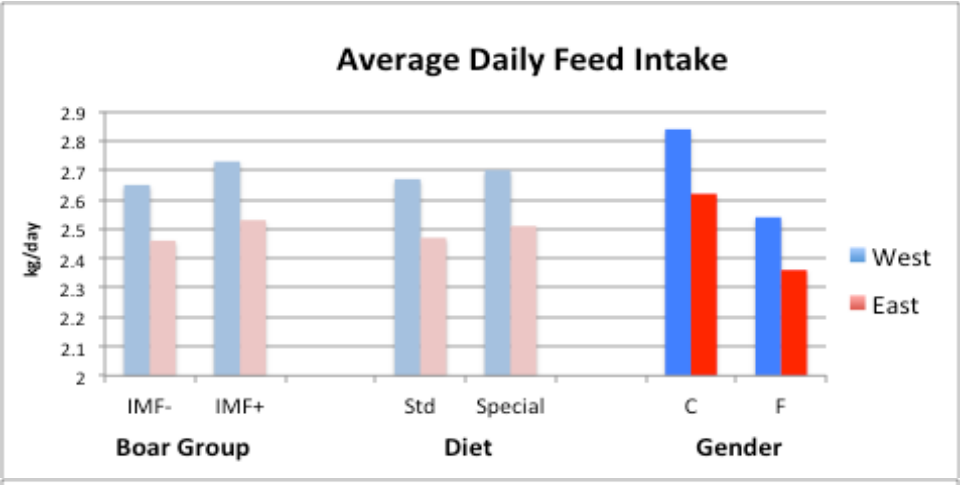
	Western Trial		Eastern Trial	
Boar group	IMF-	IMF+	IMF-	IMF+
Number of boars	26	24	28	30
Average IMF EBV	-.31%	+.48%	-.39%	+.44%

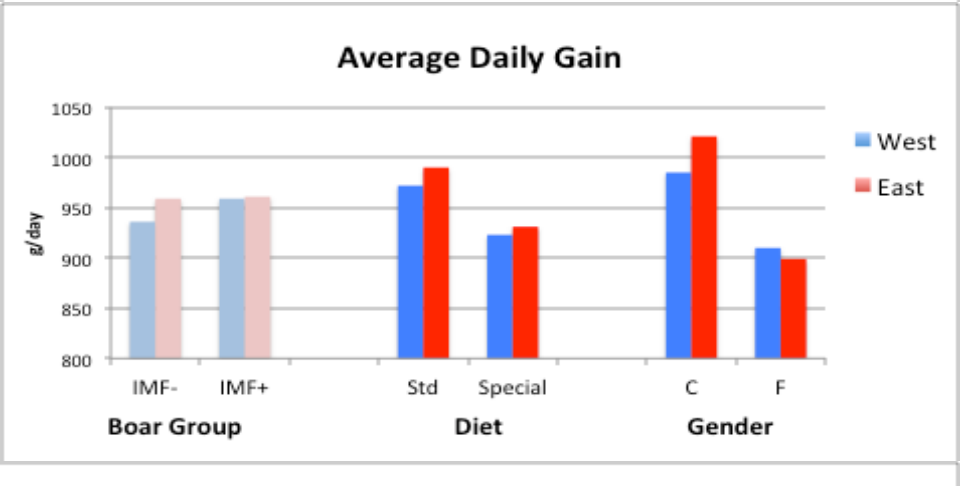
Expected IMF difference in progeny: ~.4%

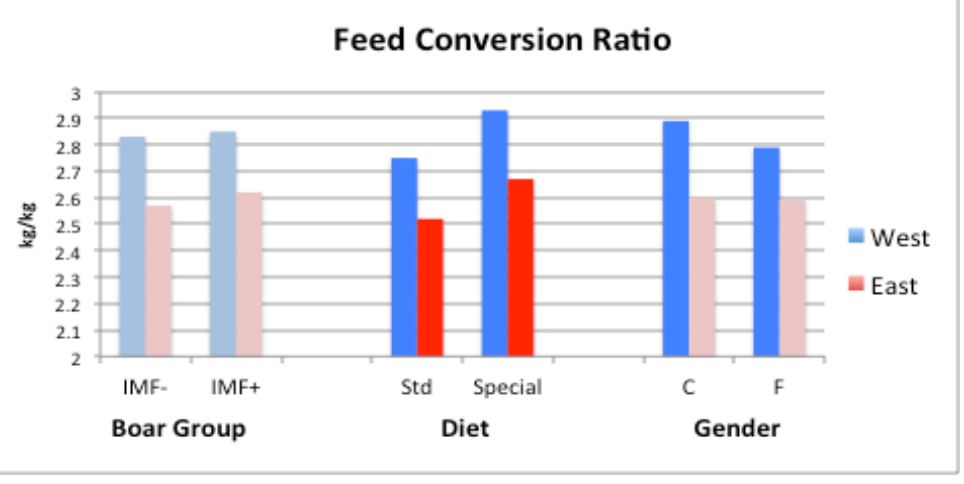
Feeding programs

- 5-phase program
- Last 2 phases (6 weeks) different between standard and special diets
- Differences in finish phase:

	Western Trial		Eastern Trial	
Diet	Standard	Special	Standard	Special
Main ingredients	Barley, Wheat	Barley, Wheat	Corn	Corn
%DDGS	20%	20%	10%	10%
Energy NE kcal/kg	2300	2350	2480	2527
Lysine AD/NE	2.65	1.62	2.74	1.66
Lysine SID %	0.61	0.38	0.68	0.42
Protein %	14.36	12.45	13.70	10.29

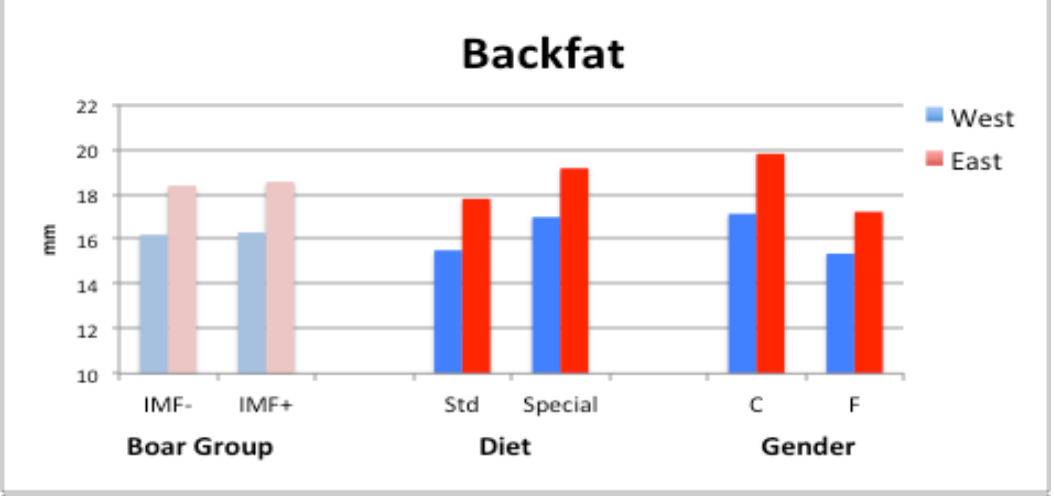


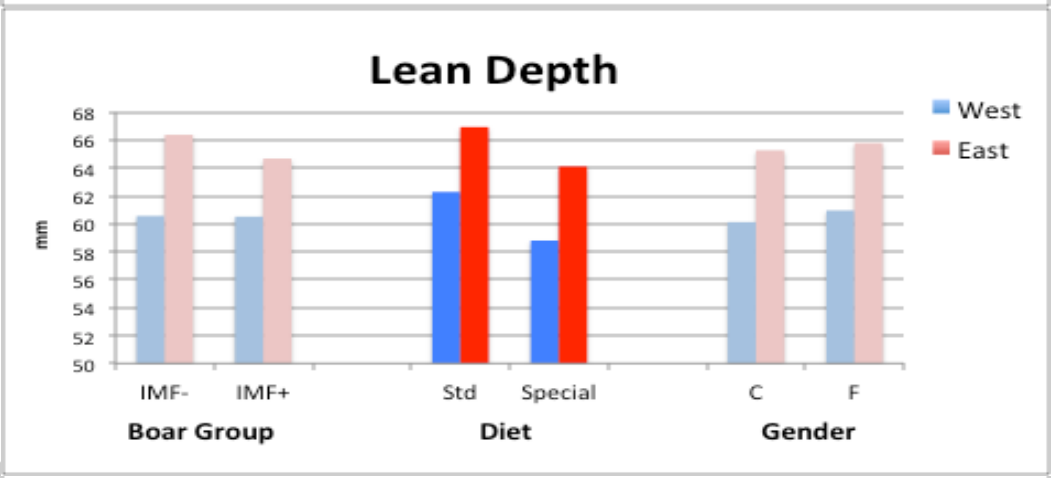


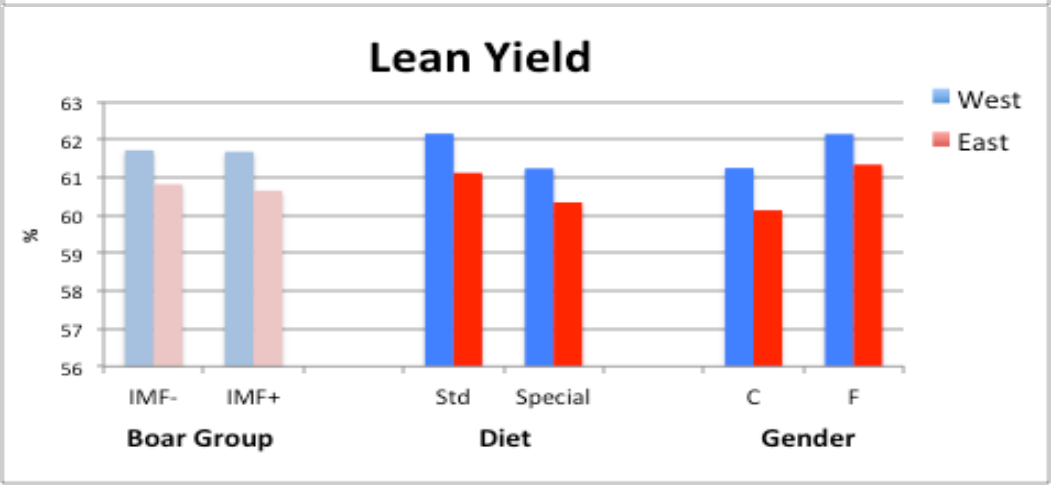


Growth & Feed Efficiency

- No difference between boar groups on growth and feed intake
- Slower growth (-54g/d) and higher FCR (+0.17) with special feed



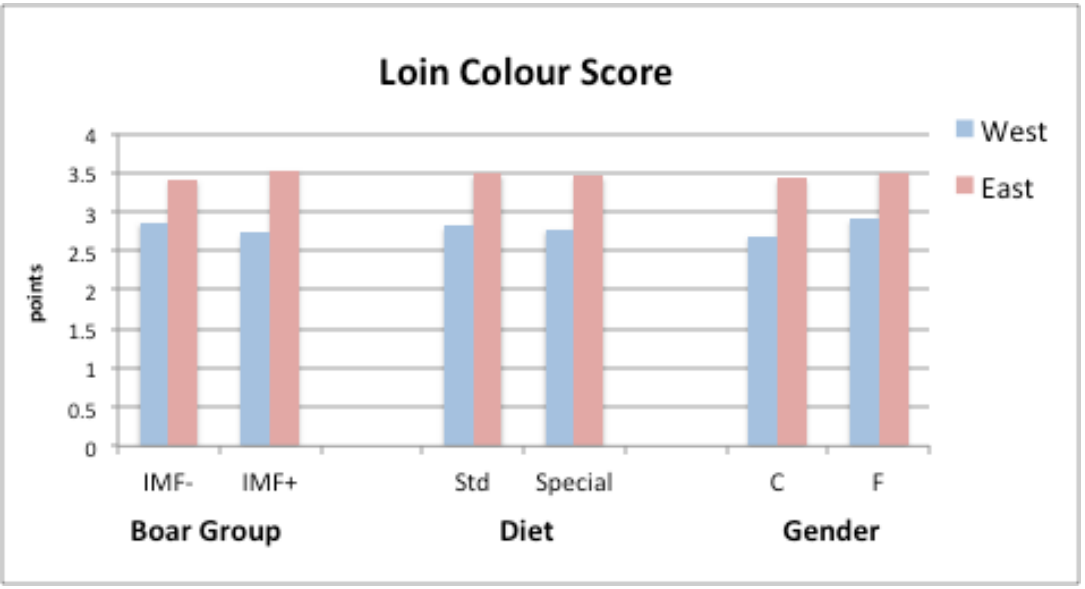


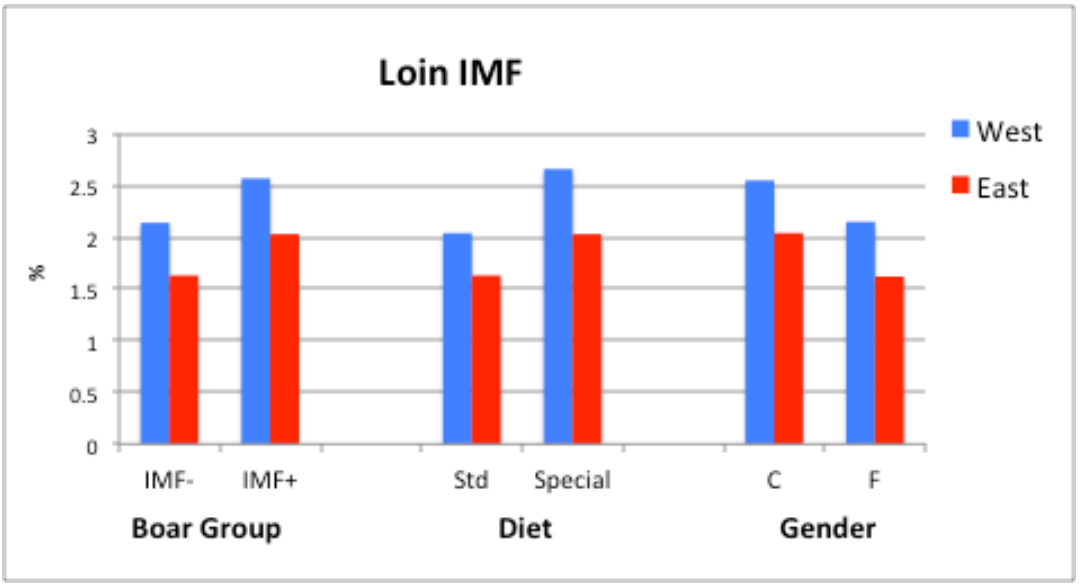


Carcass quality

- No difference between boar groups on carcass leanness
- Lower lean yield (-.85%) with special diet, due to higher backfat (+1.4mm) and lower lean depth (-3.2mm)

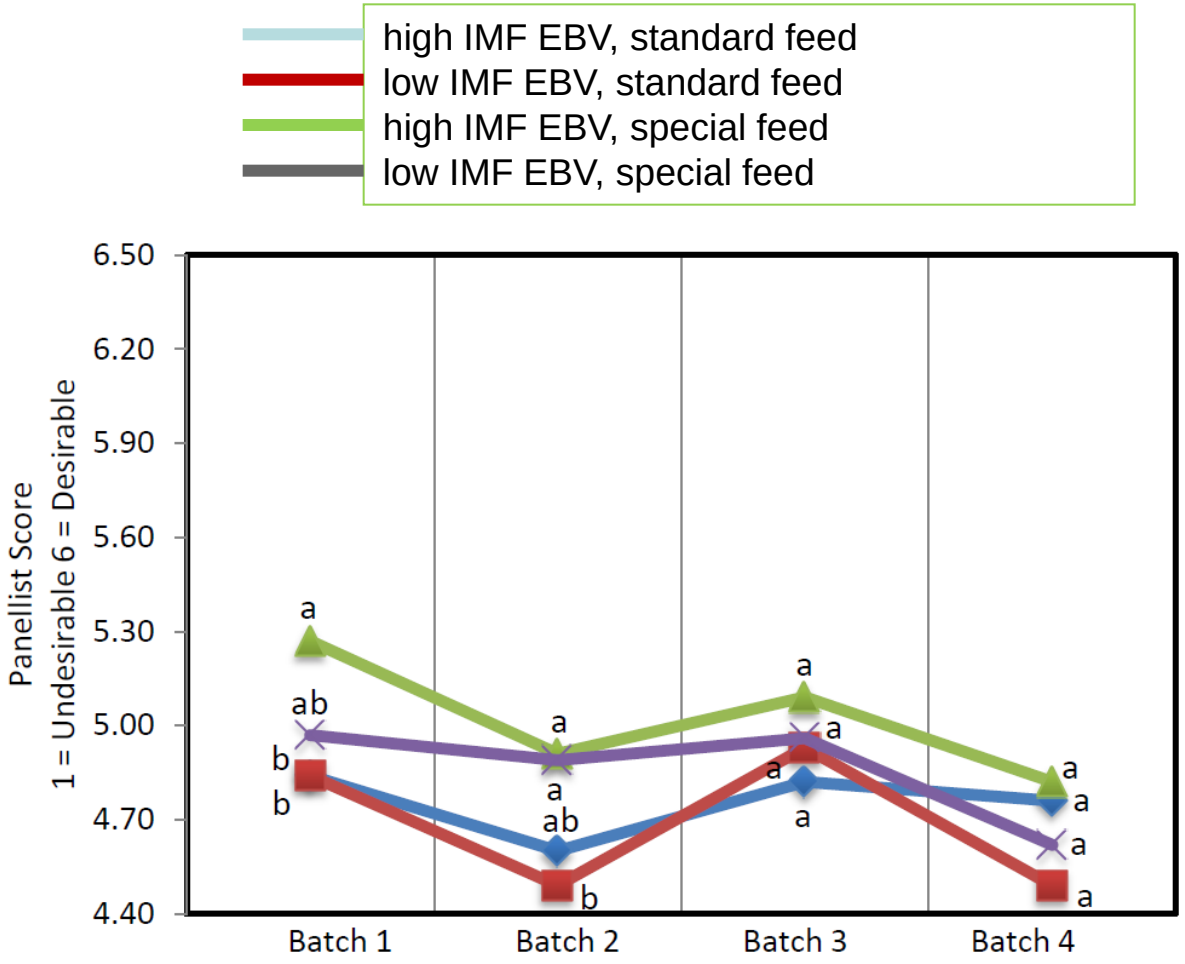
Meat quality





- No difference between boar groups or diet on meat colour
- Higher IMF (+.42%) in hogs born from IMF+ boars
- Higher IMF (+.51%) in hogs fed the special diet

Sensory analysis



Scores with different denotation within a batch indicates significant difference at $p<0.05$; whereas, scores with same denotation are not significantly different.

Economic analysis
(Western trial)

Boar group	**IMF+**	**IMF-**	**IMF+**	**IMF-**
Diet	**STD**	**STD**	**LL/NE**	**LL/NE**
Days	100.00	100.00	100.00	100.00
Barn costs	**14.00 $**	**14.00 $**	**14.00 $**	**14.00 $**
ADG (kg/d)	0.989	0.954	0.930	0.917
Barn weight (kg)	128.90	125.40	123.00	121.70
Feed efficiency (kg/kg)	2.75	2.75	2.93	2.93
Feed costs ($/pig)	**70.39 $**	**68.24 $**	**70.39 $**	**69.46 $**
Carcass weight (kg)	100.54	97.81	95.94	94.93
Index	1.1200	1.1230	1.1200	1.1230
Revenue ($/pig)	**168.91 $**	**164.76 $**	**161.18 $**	**159.90 $**
Net income (producer)	**$84.53**	**$82.52**	**$76.79**	**$76.44**
Difference ($/pig)		**-2.01 $**	**-7.73 $**	**-8.08 $**

Conclusions

- Consistent results found in both trials
- Special feeding program (low Lys): efficient to increase IMF, but with side effects on growth, feed efficiency, carcass quality
- With the use of IMF+ boars, marbling levels were increased without adverse effects on other main traits
- Differences between boar groups (IMF+ vs IMF-) were as expected based on EBV differences
- It is possible to customize IMF levels in commercial hogs with genetic and/or feeding approaches

• Perspectives

- Canadian breeders and producers now have tools to monitor and control marbling levels to address requirements from various markets

- A key factor is still missing… producers are not paid on meat quality (yet)

Acknowledgements

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- CSIP swine technicians
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Agriculture and Agri-Food Canada
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