# GRAUPE CÉRÈS Z

#### Practical experience with rye in pig feeding in Canada July, 17-18<sup>th</sup> 2019

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#### **RYE-INTRODUCTION**

- Rye is a member of the grass family Gramineae
- Most rye is grown as winter rye
- Second to wheat among the grains commonly used in the production of bread
- Used for rye whiskies production –Crown Royal, Gibson's
- Rye is a hardy crop with good frost and drought resistance and can be grown in more sandy soils with lower fertility









#### **RYE-PRODUCTION (X 1000 MT)**

Grains	Rye	Corn	Wheat	Barley	Rye USA
2015	226	13 680	27 647	8 257	291
2016	436	13 889	32 140	8 839	338
2017	342	14 095	29 884	7 891	251
2018	235	13 900	31 800	8 400	212
2019	400	15 400	34 500	9 800	
Courses	ndox Mundi				

Source: Index Mundi



#### **RYE HYBRID-NUTRIENT VALUE**

Nutrient	Rye*	Wheat	Barley	Corn
Protein %	10,7	13,0	11,0	7,8
Lysine SID %	0,27	0,29	0,31	0,19
Fat %	2,10	2,30	2,30	3,40
Crude fiber %	2,40	2,60	4,60	2,30
Total Phos %	0,27	0,33	0,30	0,24
ME kcal/kg	3170	3250	3000	3350
NE kcal/kg	2465	2470	2310	2625

\* 3 samples analyzed CTL and NIR March-June 2019





#### **NEW HYBRID RYE- KWS**

New Hybrid Rye variety – KWS Germany – FP Genetic

- Better yield (+ 30 %),
- lower height and faster pollination
- Reduced risk of contamination with ergot



### **IMPACT OF HYBRID RYE IN FINISHER**

- Trial done at the with a large swine integrator in Canada in thei finisher R&D barn
- October 2016 to February 2017
- 48 pens total with 22 pigs/pen total 1056 pigs
- 3 feeds treatment with 16 experimental units/treatment
- One single side 3 spaces wet/dry feeder per pen
- 7.3 square feet/pig at entry
- 16 weeks finisher period
- First pull 4-5 pigs/pen at week 13 and barn dump at week 16





#### **IMPACT OF HYBRID RYE IN FINISHER**

- 5 phases feed program pelleted feed
- Pen weigth done at entry, week 3, 6, 9, 13 (first pull) and week 16 (shipping)
- Daily feed data per pen from Gestal XM feed system
- Carcass grading data for back fat and loin depth on all pigs
- Complete carcass evaluation for meat quality on 96 pigs selected at week 16 (32 pigs/treatment group)



#### **FEED BUDGET AND % OF RYE**

Diet phases	kg/pig	Control	Medium	High
Phase 1	36	0,0 %	10,0 %	20,0 %
Phase 2	36	0,0 %	15,0 %	30,0 %
Phase 3	48	0,0 %	20,0 %	40,0 %
Phase 4	72	0,0 %	25,0 %	50,0 %*
Phase 5	+/- 90	0,0 %	25,0 %	50,0 %*
	280			

\* Xylanase 40 000 G added at 100 g/ton





#### **DIETS NUTRIENT SPECIFICATIONS**

	Phase 1	Phase 2	Phase 3	Phase 4	Phase 5
Protein %	18,40	16,30	14,50	13,40	13,10
Lysine SID %	1,04	0,92	0,82	0,72	0,65
NE kcal/kg	2475	2475	2425	2400	2400
Lys SID/NE	4,20	3,70	3,38	3,00	2,71
Calcium %	0,64	0,56	0,52	0,48	0,46
Av.Phos %	0,32	0,28	0,26	0,24	0,23



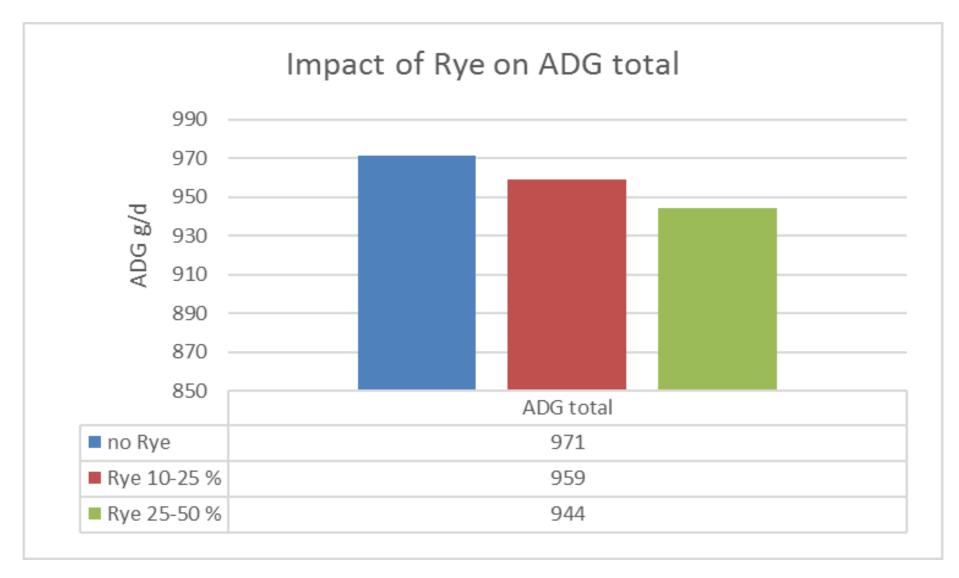
#### **FORMULA PHASE 4 FINISHER**

	Control	Medium	High
Corn	472,3	340,0	153,5
Wheat	150,0	150,0	150,0
Barley	235,9	79,90	-
Rye	-	250,0	500,0
Corn DDGS	73,2	116,5	122,3
Soybean meal	45,1	40,5	48,2
Oil	-	-	3,1
Lysine	4,50	4,50	4,20
Methionine	0,10	0,10	0,20
Threonine	1,10	1,00	1,00
Tryptophane	0,40	0,30	0,10
VTM	1,00	1,00	1,00
Others	16,4	16,2	16,4
PE P	actical experience with rve in pig feed	ling in Canada, by Dan Bussières	aar

Practical experience with rye in pig feeding in Canada, by Dan Bussières, agr.

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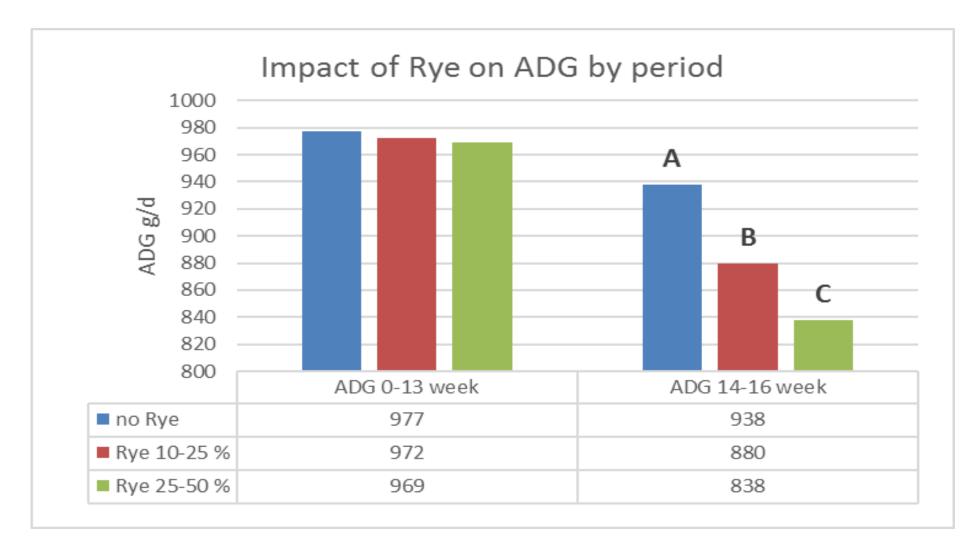




#### ADG total P value 0.20



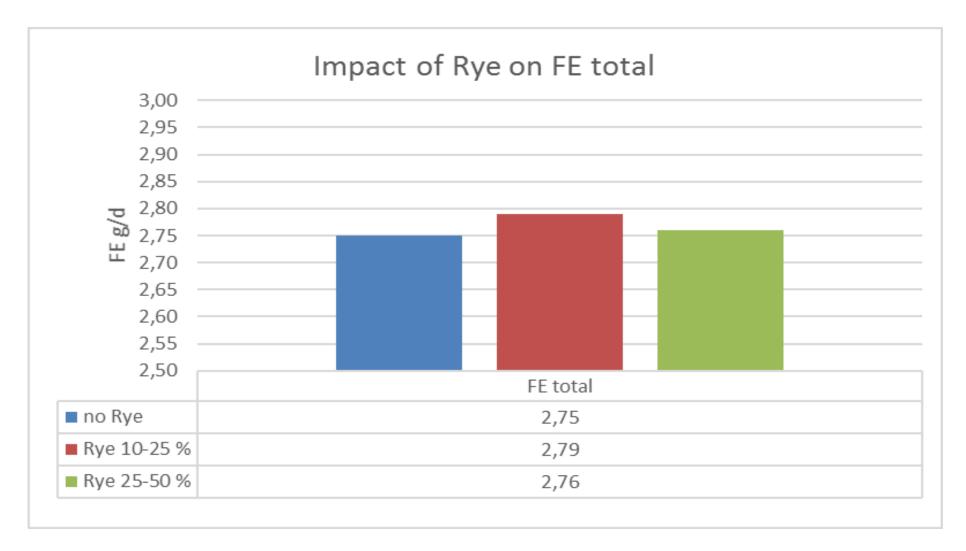




#### ADG 0-13 weeks P value NS ADG 14-16 weeks P value <0.001



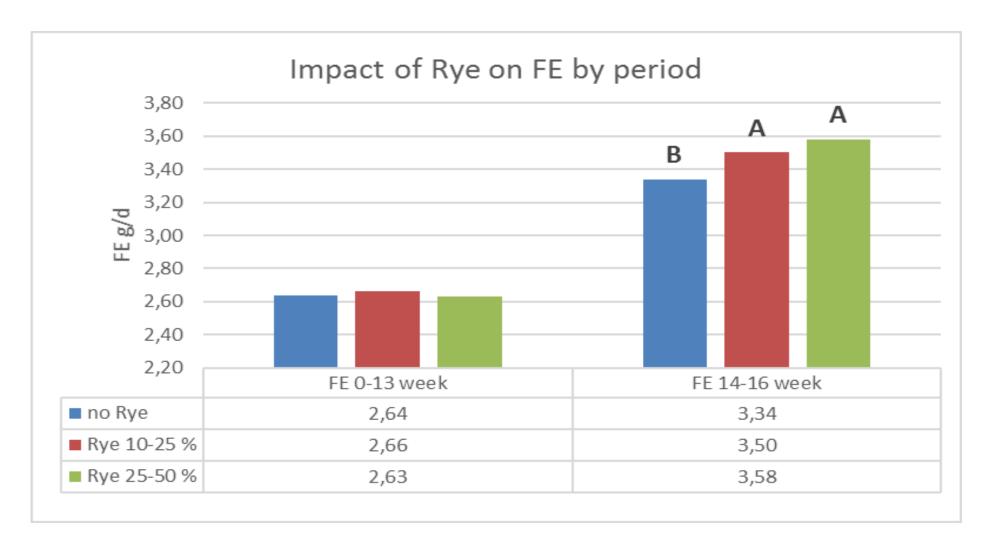




#### FE total P value NS



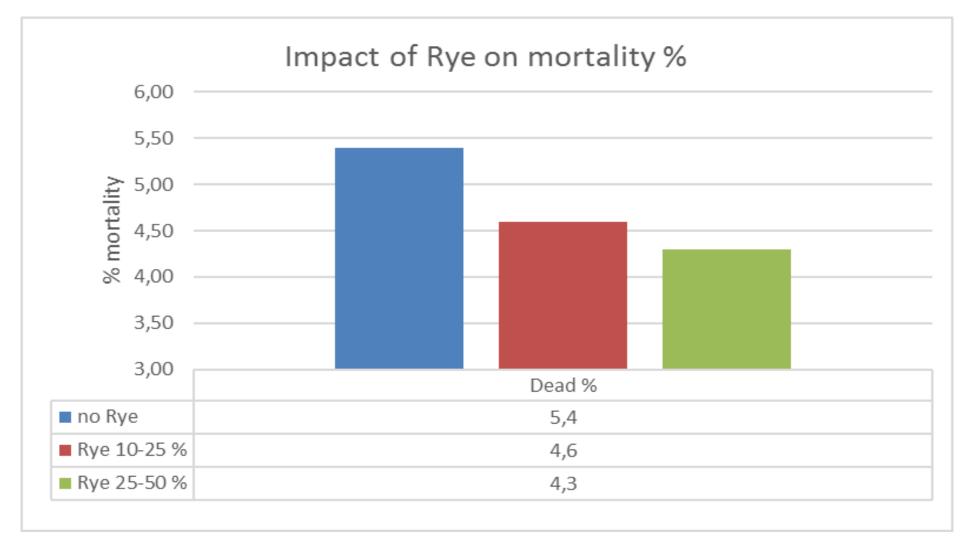




#### FE 0-13 weeks p value NS FE 14-16 weeks p value <0.05







#### Mortality (dead/pull) P value 0,77





#### HYBRID RYE TRIAL-CARCASS/MEAT QUALITY

	A – NO RYE	B – MODERATE RYE	C – HIGH RYE	P-VALUE
Dress weight (kg)	110,49	108,91	108,06	0,2022
Dressing yield (%)	81,12	80,98	81,18	0,6474
Fat (mm)	16,99	16,58	16,32	0,0848
Loin (mm)	66,17	65,63	65,51	0,2869
Primal yield %	70,29	69,55	70,31	0,0890
рН	5,54	5,57	5,57	0,5783
Loin fat IV	70,37	70,52	71,16	0,4087
Drip loss %	1,90	1,89	1,93	0,9900
NPPC loin colour	3,71	3,97	3,83	0,3494





#### HYBRID RYE TRIAL-CARCASS/MEAT QUALITY

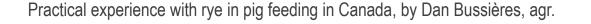
- We observed no impact on carcass and meat quality traits
- Rye can be a good alternative to wheat and barley for improving fat quality and firmness
- Lower IVP value vs wheat and barley



### **HYBRID RYE FINISHER TRIAL DISCUSSIONS**

- Performance were very similar until week 13 of the trial
- We observed a drop in performance with reduced ADG and increase in FE for the pigs on rye diet after week 13
- Corresponds to feed production with new batch of rye
- Ran out of rye early January
- 90 tons bought and tested before the trial started, but part of the rye was likely dumped into the wheat bin at entry, so ended-up to be out product before the end of the trial







### **HYBRID RYE FINISHER TRIAL DISCUSSIONS**

- High ergot contamination for rye bought early January
- First batch of rye tested at 800 ppb ergot alkaloïdes OK
- Second lot of rye tested at 4980 ppb!!!!
- Phase 5 Control 50 ppb
- Phase 5 25 % rye 921 ppb analyzed vs 1245 ppb expected
- Phase 5 50 % rye 1558 ppb analyzed vs 2490 ppb expected
- Look like the higher lever of ergot in the feed starting at week 13 has affected pig performance
- Or could it also be attributed to increased viscosity and lower rate of passage when feeding the high rye diet?





### **HYBRID RYE FINISHER TRIAL DISCUSSIONS**

- 25% rye can easily be incorporated into finishing feeds
- Level of 40-50% can also be considered
- Pay attention to the ergot level target for use in finisher diets  $\rightarrow$  0.08 % maximum (on a weight basis)
- Need to better understand potential impact on feed intake with higher rye and increased viscosity
- High level of fructane (4x more vs wheat) gut health benefit, ↑ butyric acid
- Rye has been used in commercial finisher diet from June 2017 to August 2018 at one of their feed mill

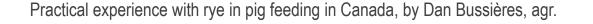




### **IMPACT OF HYBRID RYE IN NURSERY**

- Trial done with a large swine integrator in Canada in their nursery R&D barn
- Trial started in March 2018
- 48 pens total with 24 pigs/pen total 1152 pigs
- 3 feeds treatment with 16 experimental units/treatment
- One single side 5 spaces dry feeder per pen
- 3.0 square feet/pig at entry
- 47 days trial period







### **IMPACT OF HYBRID RYE IN NURSERY**

- 4 phases feed program
- Pen weigth done at entry and then weekly with last week being 5 days period
- Daily feed intake data measured by using a feed cart of load cell
- Scour index monitored daily with an evaluation score notation from 0 to 5, zero being no scour and 5 being very watery scour
- Individual weight done at entry and at the end to meausre weight variation



#### **FEED BUDGET AND % OF RYE**

Diet phases	kg/pig	Control	Medium	High	
Phase 1	2.0		0,0 %		
Phase 2	5.0	0,0 %			
Phase 3	12.0	0,0 %	10,0 %	20,0 %	
Phase 4	20.0	0,0 %	20,0 %	40,0 %	
	39.0				

Xylanase 40 000 G added at 100 g/ton in all diets for all treatment group

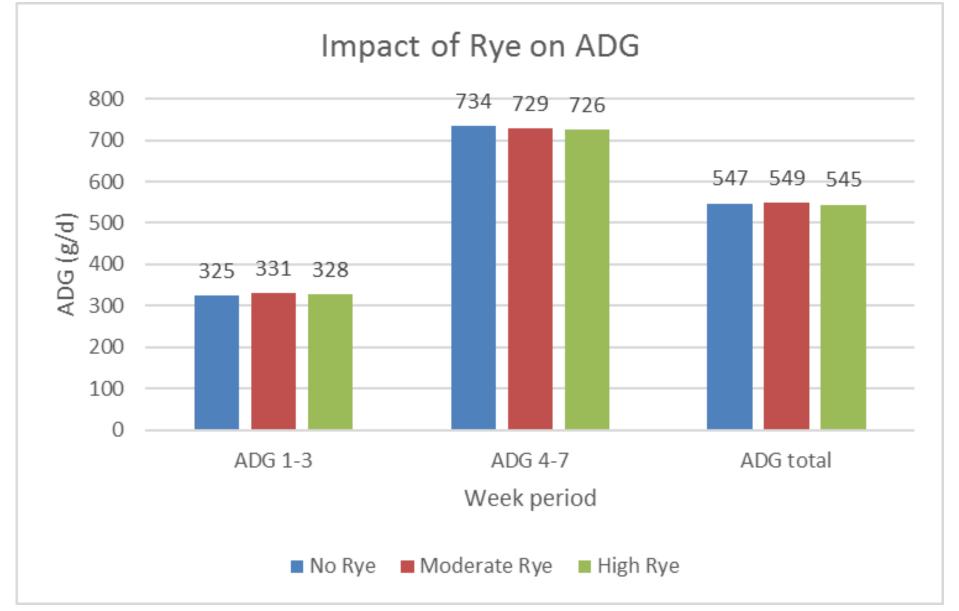




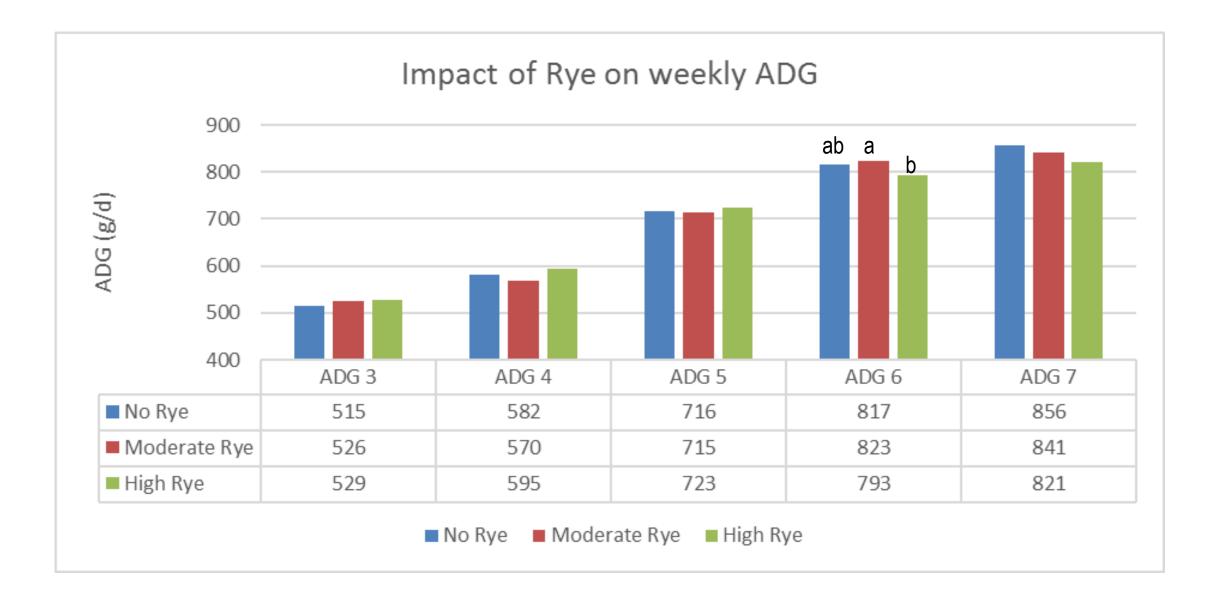
#### **DIETS NUTRIENT SPECIFICATIONS**

	Phase 1	Phase 2	Phase 3	Phase 4
Protein %	20,8	20,2	20,2 - 20,5	19,2 - 19,9
Lysine SID %	1,34	1,25	1,20	1,11
NE kcal/kg	2475	2375	2400	2450
Lys SID/NE	5,43	5,26	5,00	4,55
Crude fat %	5,72	5,23	4,96-5,21	4,80-5,30
Crude fiber %	3,00	3,48	3,50-3,57	2,74-2,88
Calcium %	0,65	0,65	0,65	0,70
Av.Phos %	0,50	0,45	0,40	0,35



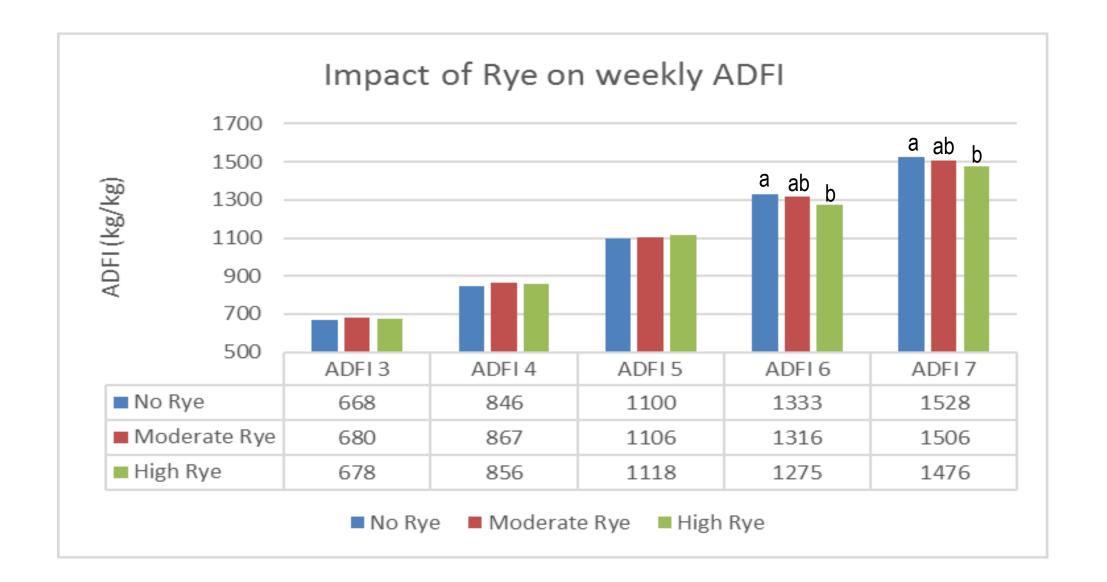






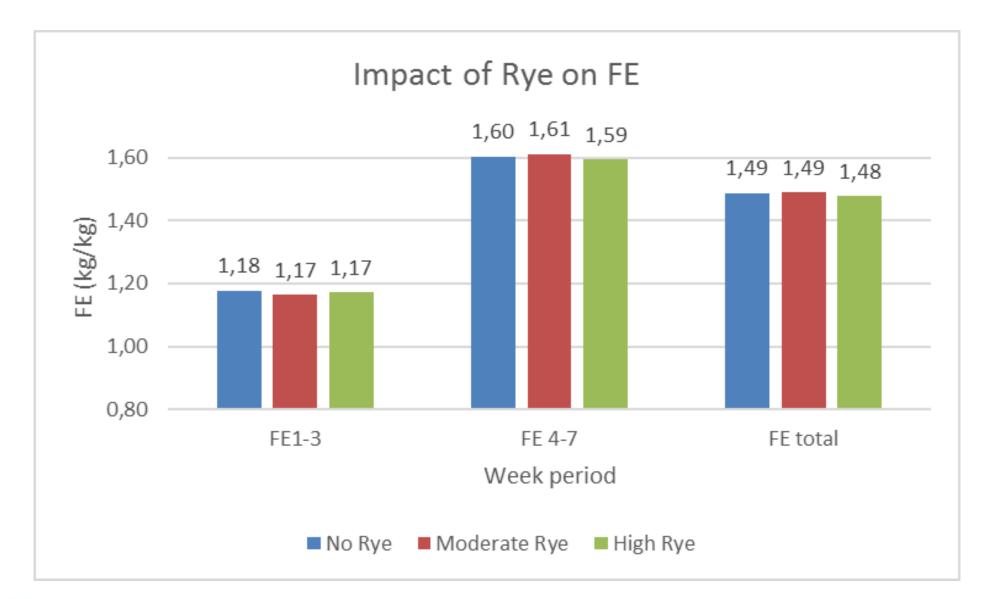






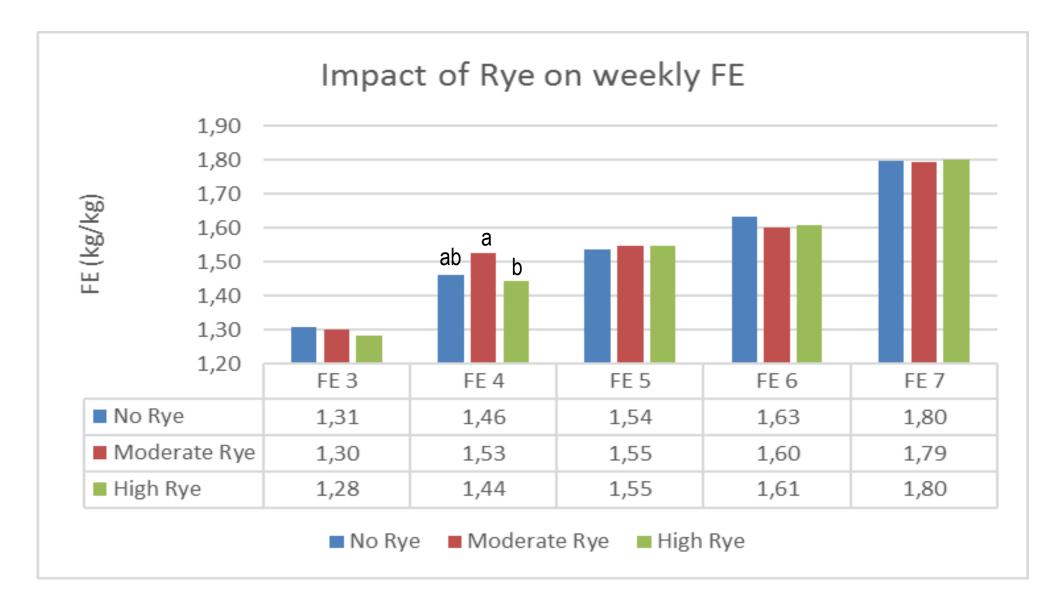






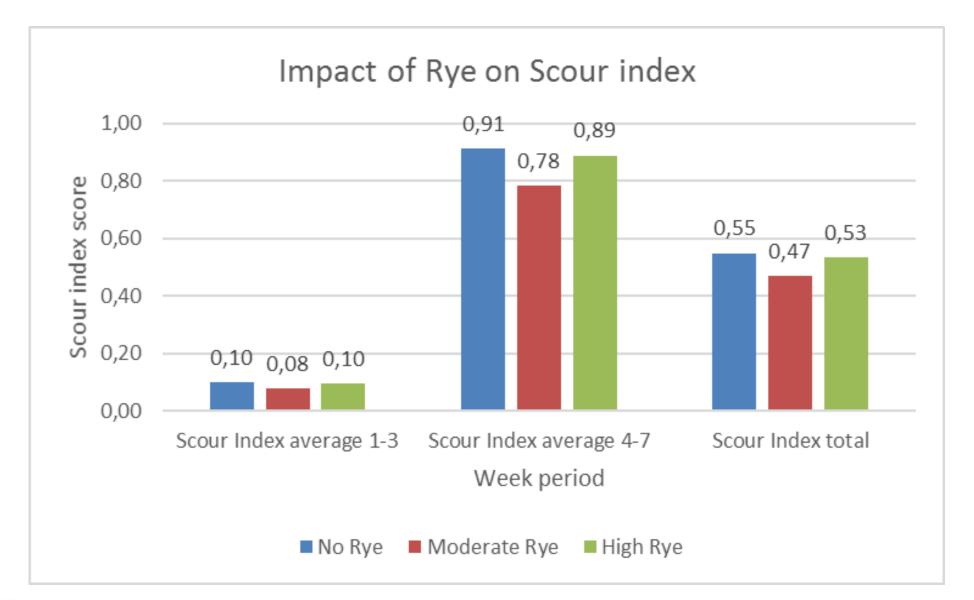






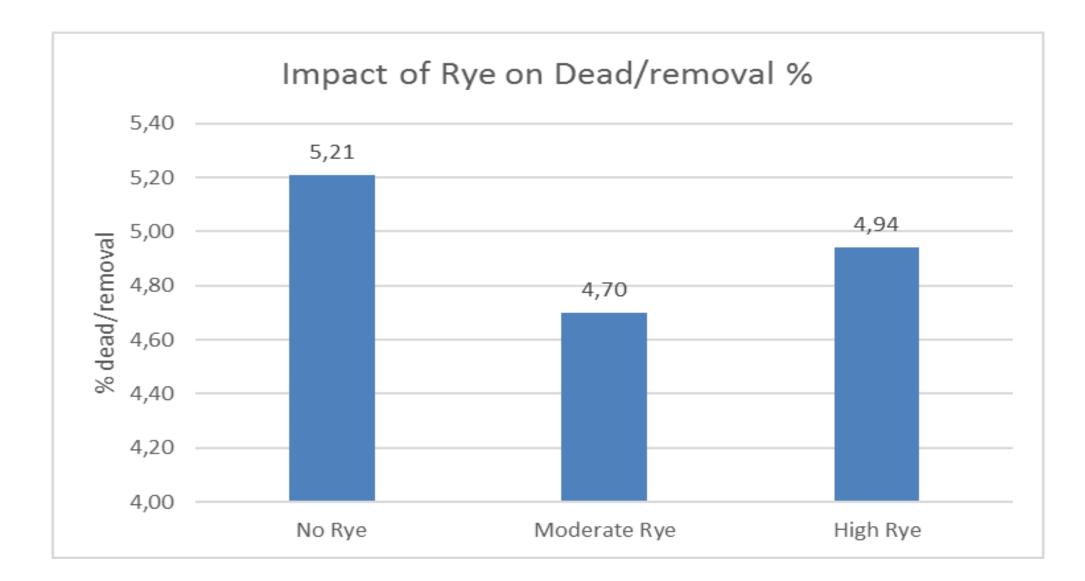
















#### **ERGOT ANALYSIS**

Diet	No Rye	No Rye Medium Rye			Rye
	Analyzed	Analyzed Objective		Analyzed	Objective
Phase 3	< 5 ppb	160 ppb	126 ppb	519 ppb	252 ppb
Phase 4	< 5 ppb	235 ppb	252 ppb	475 ppb	504 ppb
Average		198 ppb	189 ppb	497 ppb	378 ppb

Rye sample : 1261 ppb ergot. DON, Zearalenone level very low/under DL Objective : Calculated by using % rye inclusion rate x 1261 ppb Analysis done by Actlab in Ontario





### HYBRID RYE NURSERY TRIAL DISCUSSIONS

- No difference in growth performance and feed efficiency for the overall trial period
- We observed a reduction in feed intake in the last 2 period of the trial (week 6 and 7), which led to drop in ADG in week 6 and a numerical reduction in ADG in week 7, but not statistically significant (p = 0.1723)
- Is this an impact of the ergot level in the rye diet or the too high rye level?
- Or an impact of higher viscosity due to NSP?
- Not impact on week 3, 4 and 5 when introducing rye in the diet, so not likely to be a rye impact on palatability at least
- More likely to be an impact of the moderate ergot contamination and build-up over time or NSP content/viscosity





### HYBRID RYE NURSERY TRIAL DISCUSSIONS

- 10-20 % rye can easily be incorporated into nursery diet from 12 to 30 kg
- Level up to 40 % can be considered
- Pay attention to the ergot level target for use in nursery diets  $\rightarrow$  0.04 to 0.05 % maximum (on a weight basis) for the Rye or < 200-250 ppb in the final feed
- Inclusion level need to be adjusted base on potential contamination with ergot in the rye



#### **ERGOT CONTAMINTATION**

- As with any other toxins, no clear cut threshold level for ergot in swine diet
- Report that >1 ppm ergot alkaloïds impacted growth on weaned pig (35 days to 63 days of age)
- 2 ppm  $\rightarrow$  3.0 % reduction in ADG
- 5 ppm  $\rightarrow$  15.0 % reduction in ADG
- 10 ppm  $\rightarrow$  24 % reduction in ADG
- CFIA max tolerance level 4-6 ppm ?????

Other reference

- Low 0.5 ppm
- Moderate- 1.0 ppm
- High 2.0 ppm







#### **ERGOT CONTAMINTATION**

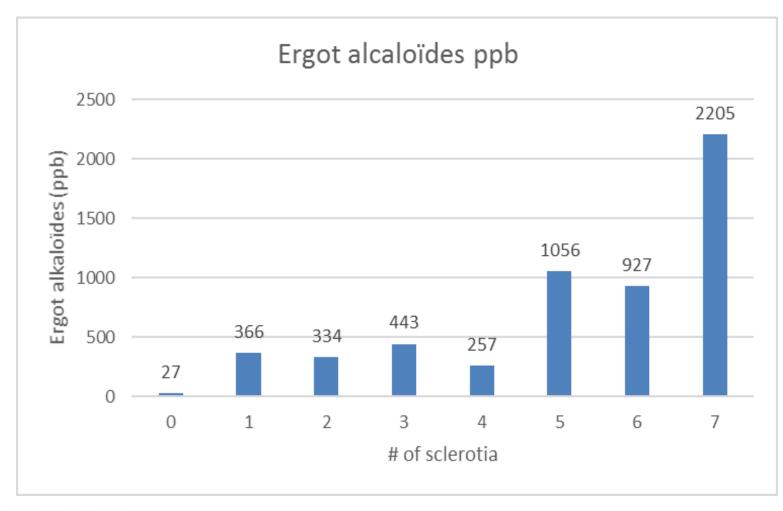
- ACT lab analysis on 6 ergot alcalöides
- Ergocomine, Ergocristine, Ergocryptine, Ergometrine, Ergosine, Ergotamine
- Sum of all 6 give the total ergot alkaloïds







# **ERGOT ANALYSIS VS # SCLEROTIA**



Analysis at PDS lab # sclerotia in 0.5 liter of grains Average of 200 ppb/sclerotia 0.04 % in weight = about 5 sclerotia 0.04 % in weight = about 1000 ppb





### **ERGOT CONTAMINTATION**

- Recommended Quality Assurance SOP for Ergot
- 0.5 liter and count the # of sclerotia trying to asses count on complete sclerotia kernel
- Sow/Nursery : max 0.04 % on weight basis which should represent 1000 ppb
- Finisher : max 0.08 % on weight basis which should represent 2000 ppb
- Maximum inclusion rate adjusted base on risk of contamination
- Sow and Nursery finish feed : target max 0.20 ppm
  - 200 kg/t max on 1000 ppb product
- Finisher : target max 0.50 ppm
  - 250 kg/t max of 2000 ppb product





### **USE OF RYE**

- Rye used in finisher diet at one large feed mill from June 2017 to August 2018
  – 2100 ton/month on average
- Average rye price 200 \$/t (180 to 240 \$/t range)
- Average corn, wheat, barley price were respectively 185 \$, 232 \$, 210 \$ per ton
- Rye vs wheat : 86,3 %
- Rye vs corn : 108.0 %
- Rye vs barley : 95.2 %
- Average inclusion rate was 12 % in the finisher diet
- Average saving 1-3 \$/t





#### **USE OF RYE**

- Had no issue with performance
- Average particle size on the rye was 350-375 microns
- Corn 250-300 microns and wheat/barley 325-375 microns





#### **RYE INTEREST PRICE**

Interest price Hybrid Rye KW	S							
		Low NE	High NE					
Relative rye price vs	Corn	103,5%	94,0%					
	Wheat	98,6%	95,0%					
	Barley	109	,0%					
Corn price \$/t	180,00 \$	190,00 \$	200,00 \$	210,00 \$	220,00 \$	230,00 \$	240,00 \$	250,00 \$
Interest price Rye \$/t Low NE	186,30 \$	196,65 \$	207,00\$	217,35\$	227,70\$	238,05 \$	248,40 \$	258,75\$
Interest price Rye \$/t High NE	169,20 \$	178,60 \$	188,00 \$	197,40 \$	206,80 \$	216,20\$	225,60 \$	235,00 \$
Wheat price \$/t	190,00 \$	200,00 \$	210,00 \$	220,00 \$	230,00 \$	240,00 \$	250,00 \$	260,00 \$
Interest price Rye \$/t Low NE	187,34 \$	197,20\$	207,06 \$	216,92\$	226,78\$	236,64 \$	246,50\$	256,36\$
Interest price Rye \$/t High NE	180,50 \$	190,00 \$	199,50 \$	209,00 \$	218,50 \$	228,00 \$	237,50 \$	247,00 \$
Barley price \$/t	170,00 \$	180,00 \$	190,00 \$	200,00 \$	210,00 \$	220,00 \$	230,00 \$	240,00 \$
Interest price Rye \$/t Low/High NE	185,30 \$	196,20 \$	207,10\$	218,00 \$	228,90 \$	239,80 \$	250,70 \$	261,60\$
Interest price is the price at which the R	ve will start t	o compete v	/ith the refere	ence inaredie	ent and start t	o pull-in		





# **QUESTIONS ?**





