Increasing hybrid rye substitution level for wheat grain with or without enzyme on growth performance and carcass traits of grower-finisher barrows and gilts.

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Alberta Government

Gowans FEED CONSULTING

Introduction

- **New European hybrid rye:**
  - More resistant to ergot & fusarium
  - Greater yield/unit land;
  - Lower content of anti-nutritional factors;
- **Greater non-starch polysaccharides (NSP) content in rye**:
  - May benefit from NSP enzyme inclusion.

%	Rye	Wheat
Total NSP	18.4	11.3
Arabinose	2.4	2.8
Xylose	4.0	4.5
Glucose	4.0	1.2
Uronic acid	7.2	<2.8

Introduction

- Feeding 60% rye to grow-finisher did not affect performance;
- Need to be validated in Western Canada under commercial environment;

Objective: Test effects of increasing hybrid rye inclusion by replacing wheat grain and the effect of NSP enzyme inclusion on:

- Growth performance;
- Carcass traits;
- Feed cost.

Materials and Methods

- **Drumloche Research Barn**

- 2 Rooms;
- 52 pens in each room;
- 6 feed bins per room;

Materials and Methods

- **Test barn:**
  - 1008 test pigs;
  - 48 pens, 21 pigs per pen;
  - Housed by gender;
  - 4 recovery pens;
  - 0.7$m^{2/}$pig;
  - Started 44kg of BW;
  - Wet-dry feeder;
  - Extra drinker;
  - Feed Logic feeding unit.

Materials and Methods

- **Design:**
  - 3 x 2 x 2 factorial design;
  - 3 substitution levels of rye (Low, medium, high);
  - 2 levels of enzymes (0 or 0.02%);
  - 2 genders;
  - Pigs blocked by gender and initial BW;
  - 8 replicate pens per treatment;
- **Analysis:**
  - Proc mixed in SAS;
  - Fixed terms: Rye level, enzyme, gender;
  - Random term: Block;

1		52
2	Block 1 Barrow	51
3		50
4		49
5	Block 1 Gilt	48
6		47
7		46
8	Block 2 Barrow	45
9		44
10		43
11	Block 2 Gilt	42
12		41
13		40
14	Block 3 Barrow	39
15		38
16		37
17	Block 3 Gilt	36
18		35
19		34
20	Block 4 Barrow	33
21		32
22		31
23	Block 4 Gilt	30
24		29
25		28
26		27

Materials and Methods

- **Ingredient sources:**
  - **Wheat:**
    - Mainly soft wheat 10-11% protein;
    - Some CPS and small chance of Hard Red Spring;
    - Grown within 100-160 km radius of Irma, AB;
  - **Rye:**
    - Hybrid variety developed by KWS LOCHOW GMBH (Bergen, Germany);
    - Grown at Kalco Farms near Gibbons, AB;
  - **Enzymes:**
    - Endofeed WDC (GNC Bioferm, Bradwell, SK);
    - Containing 1400 units/g β-glucanase;
    - 4500 units/g xylanase;
    - Inclusion level of 200 mg/kg.

Materials and Methods

- **Ingredient specs:**

Formulation:

RM code	SFM004	SFM112
Name	Wheat 11% CP	Rye 9.9% CP
DM	85.40	86.40
CP	11.07	9.94
EE	1.63	1.49
ASH	1.98	1.18
NDF	9.86	13.26
ADF	3.41	3.43
STARCH TOT	57.59	57.82
NE GFL	2.47	2.39
STTD P	0.12	0.09
SD LYS	0.26	0.28
SD M+C	0.36	0.31
SD THR	0.27	0.24
SD TRP	0.12	0.08

Analysed

	Wheat	Rye
	Batch average	
Starch	55.2	50.9
Crude protein	12.2	10.1
NDF	9.8	11.0
ADF	2.7	2.6
Crude fibre	2.1	1.8
Ash	1.5	1.4
Crude fat	1.9	1.8
Potassium	0.4	0.5
Phosphorus	0.3	0.3
Magnesium	0.1	0.1
Chloride	0.1	0.1
Calcium	0.0	0.0
Sodium	0.0	0.0

Materials and Methods

- **Diets**

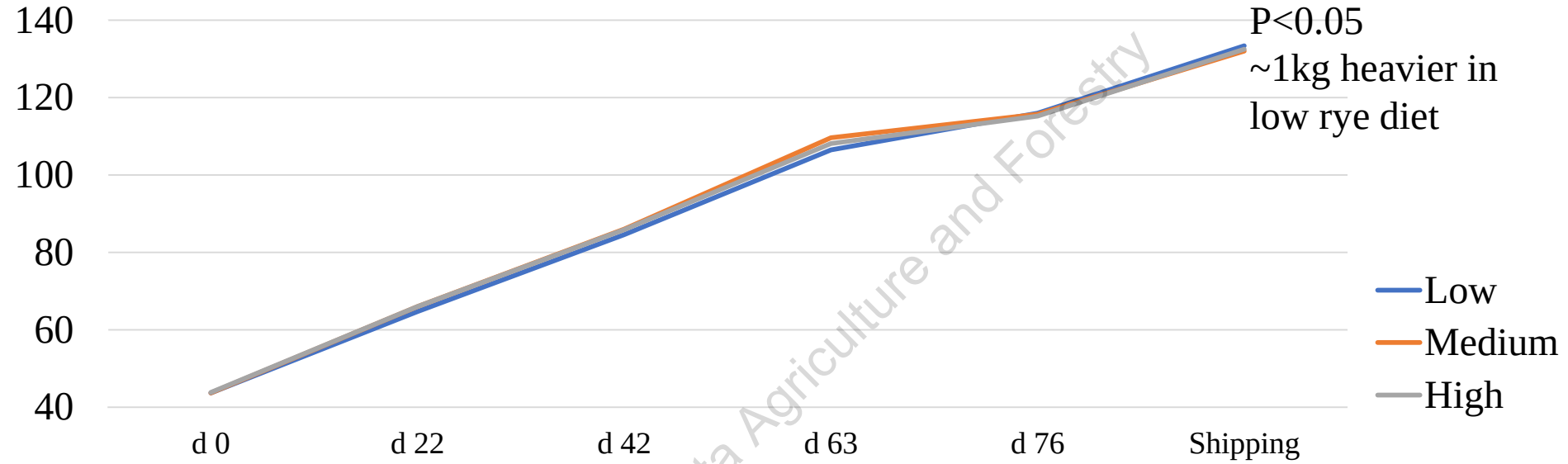
	Grower 2			Grower 3			Finisher 1			Finisher 2		
	Rye inclusion			Rye inclusion			Rye inclusion			Rye inclusion		
	Low	Med	High	Low	Med	High	Low	Med	High	Low	Med	High
Wheat	313.1	155.7	20.0	412.1	205.1	20.0	440.7	219.3	20.0	456.5	226.8	20.0
Rye	156.6	312.0	446.0	206.0	410.3	591.4	220.3	439.0	635.8	228.2	455.0	659.2
wDDGS	287.2			217.2			234.5			240.1		
Peas	204.8			139.1			81.0			52.2		
Canola oil	13.2	15.4	17.3	4.0	6.9	10.0	4.0	7.1	9.9	4.0	7.2	10.2
L-Lys	4.70	4.67	4.65	4.0	3.96	3.94	3.50	3.46	3.43	3.20	3.16	3.12
Others	20.4	20.2	20.0	17.6	17.4	18.4	16.0	15.6	15.4	15.8	15.5	15.2
NE Mcal/kg	2.30			2.30			2.30			2.30		
SID Lys/NE	3.89			3.31			2.91			2.69		

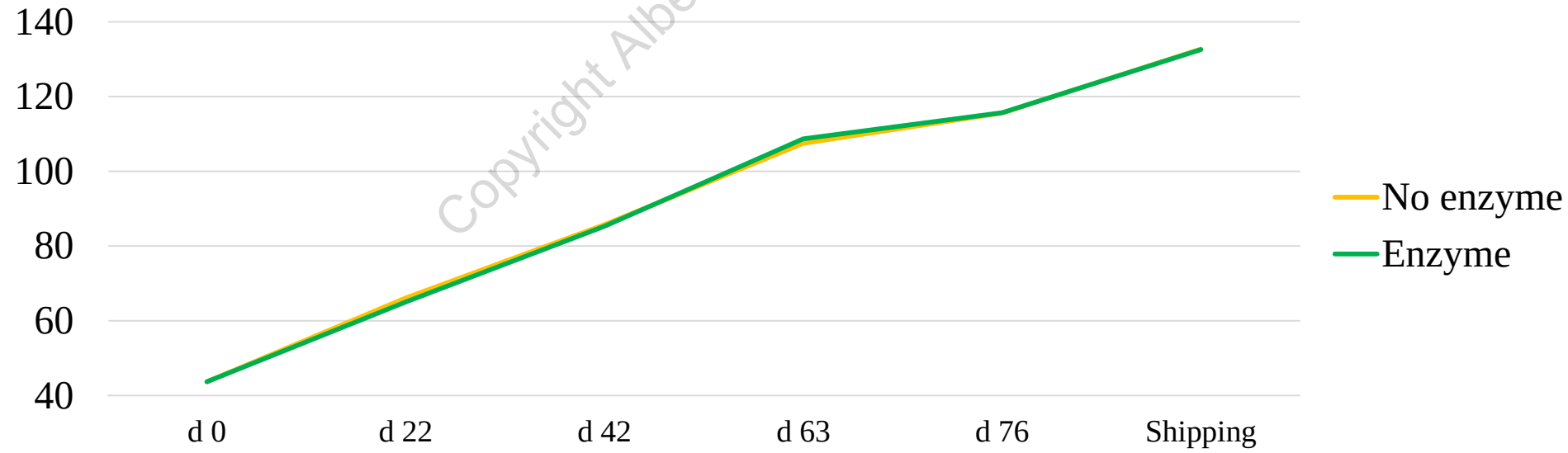
Others: Limestone, Mono-cal, Salt, DL-Met, L-Thr, Phytase, Feeder Micro.

Materials and Methods

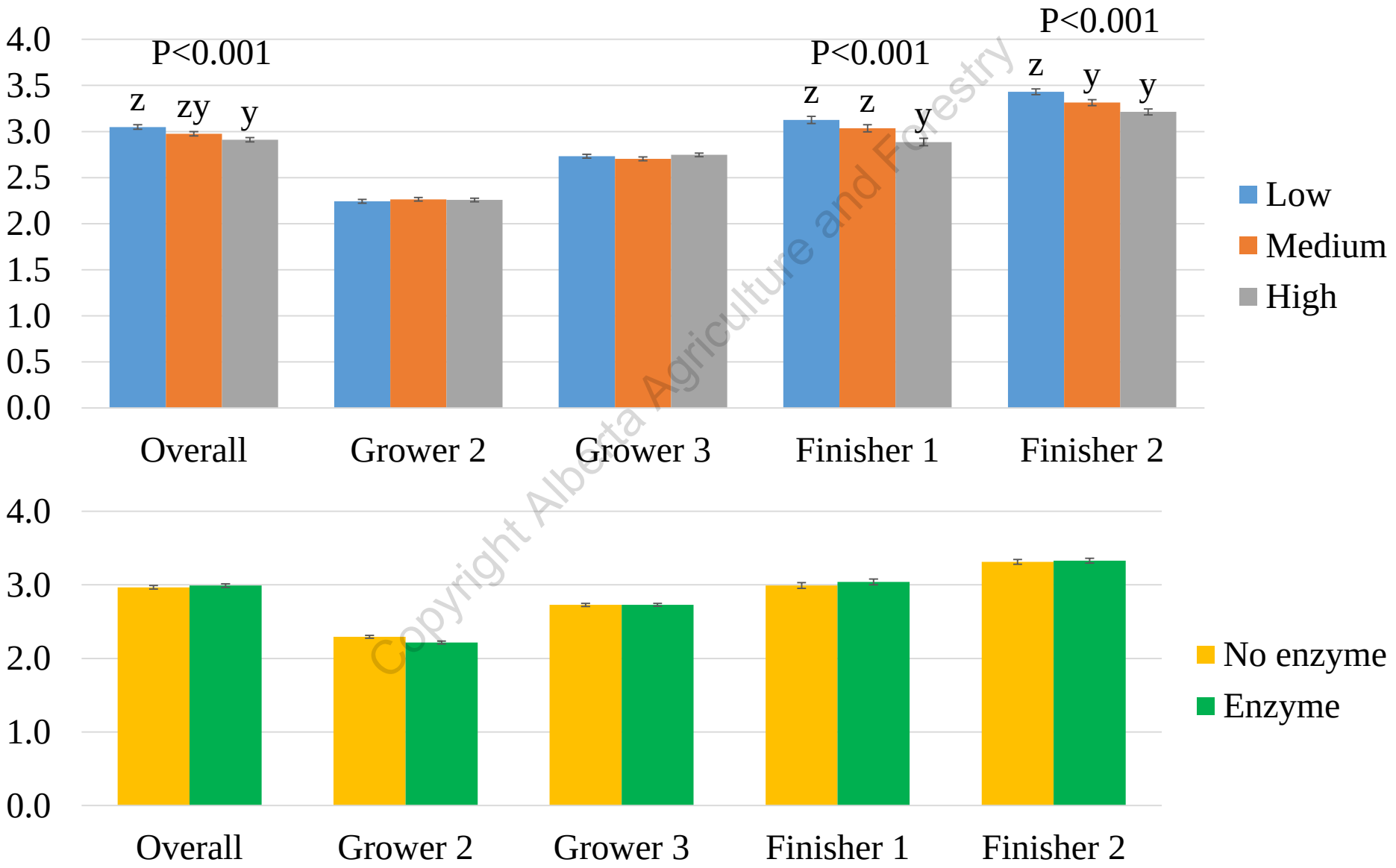
- **Measurements:**
  - Pig weights every 2 weeks;
  - Feed remaining;
  - Market weight;
  - **Carcass:**
    - Backfat;
    - Loin depth;
    - Weight;
    - Index;
  - **Cost:**
    - Income over feed cost.

Body weight, kg

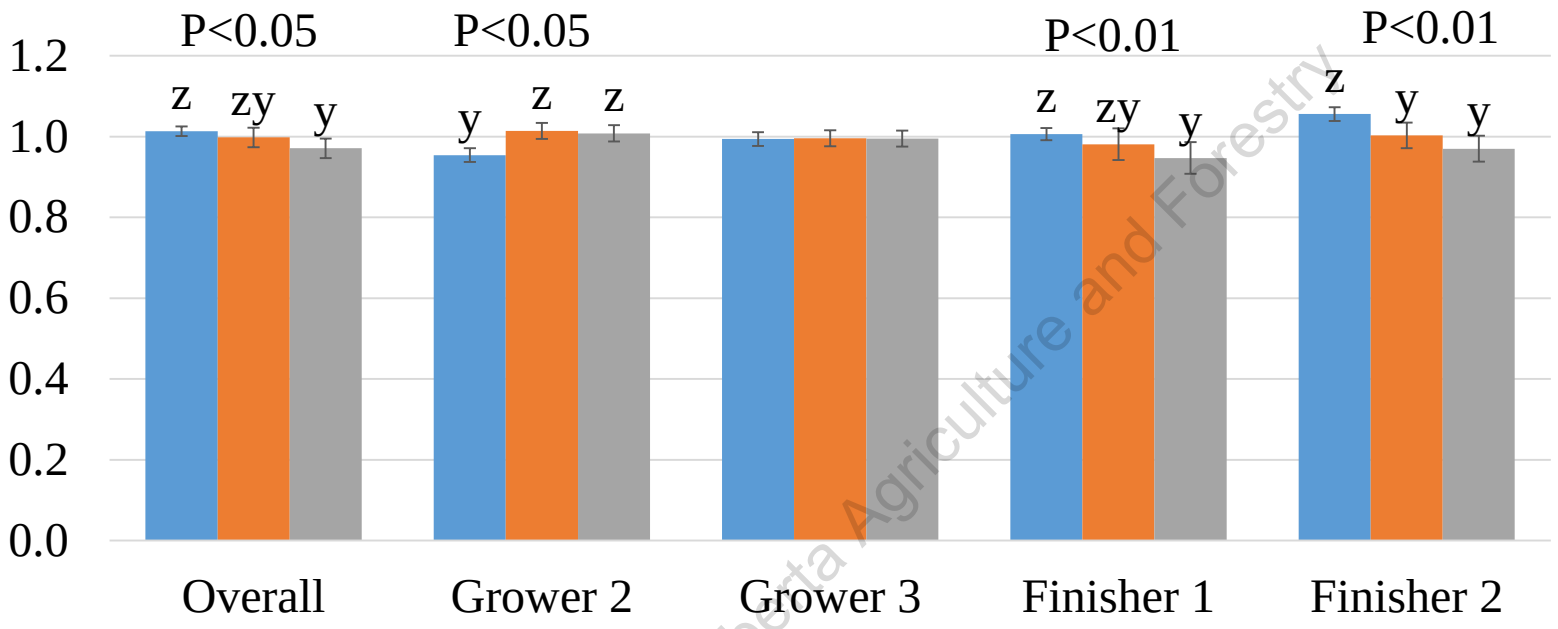


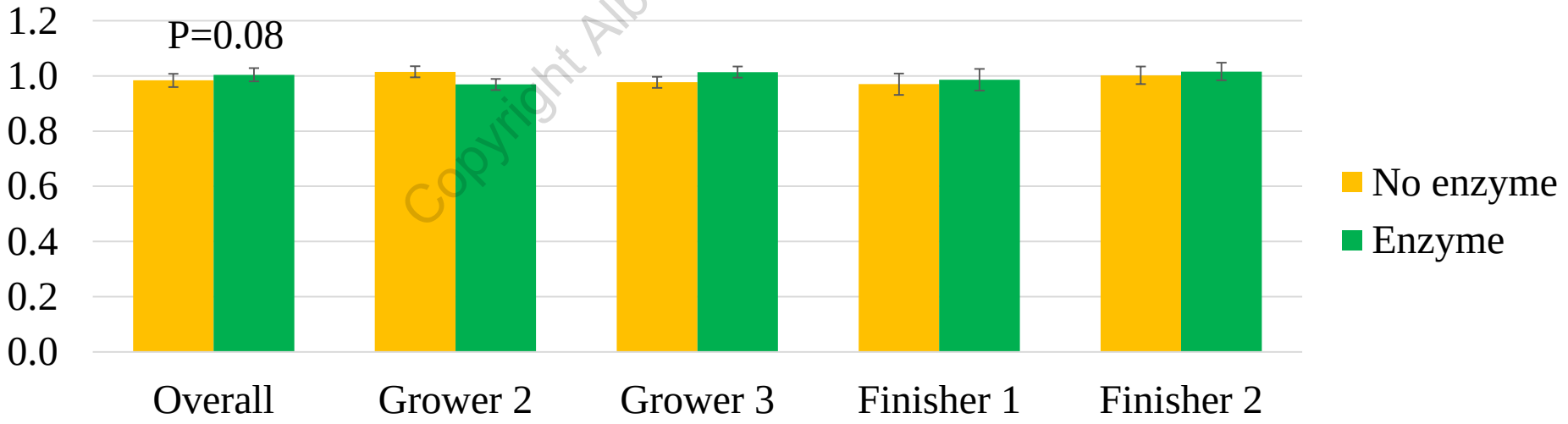


ADFI, kg

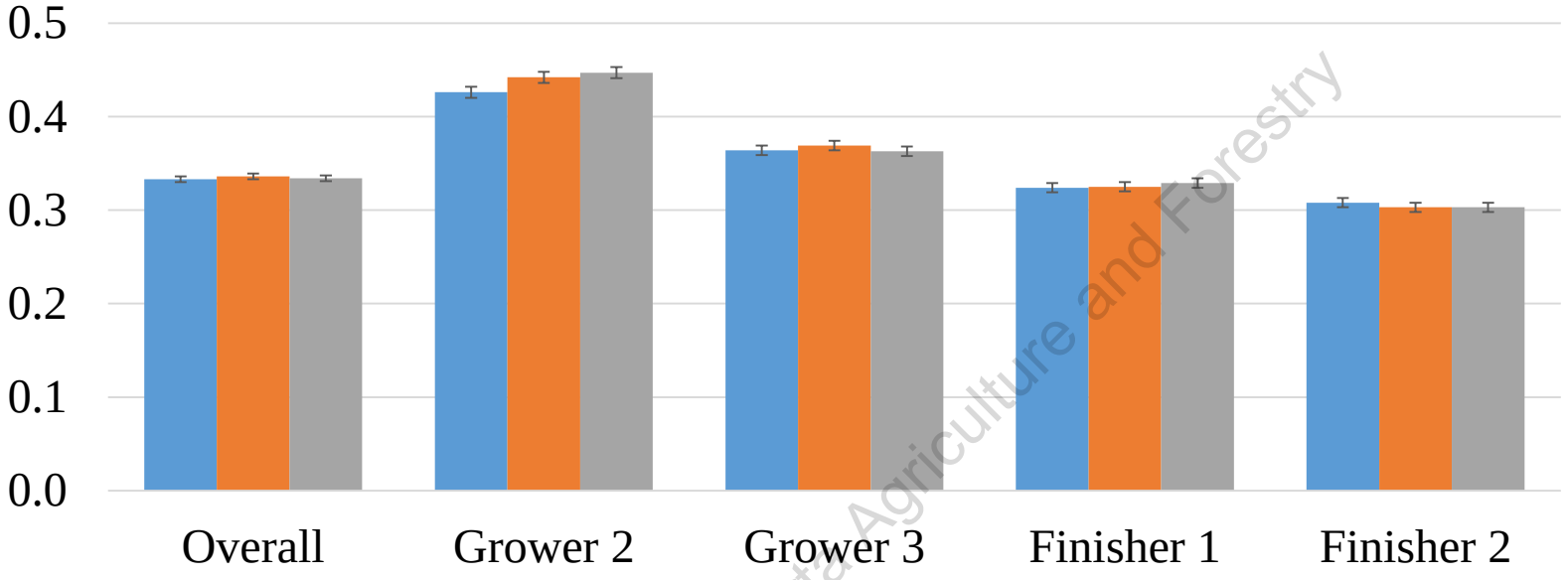


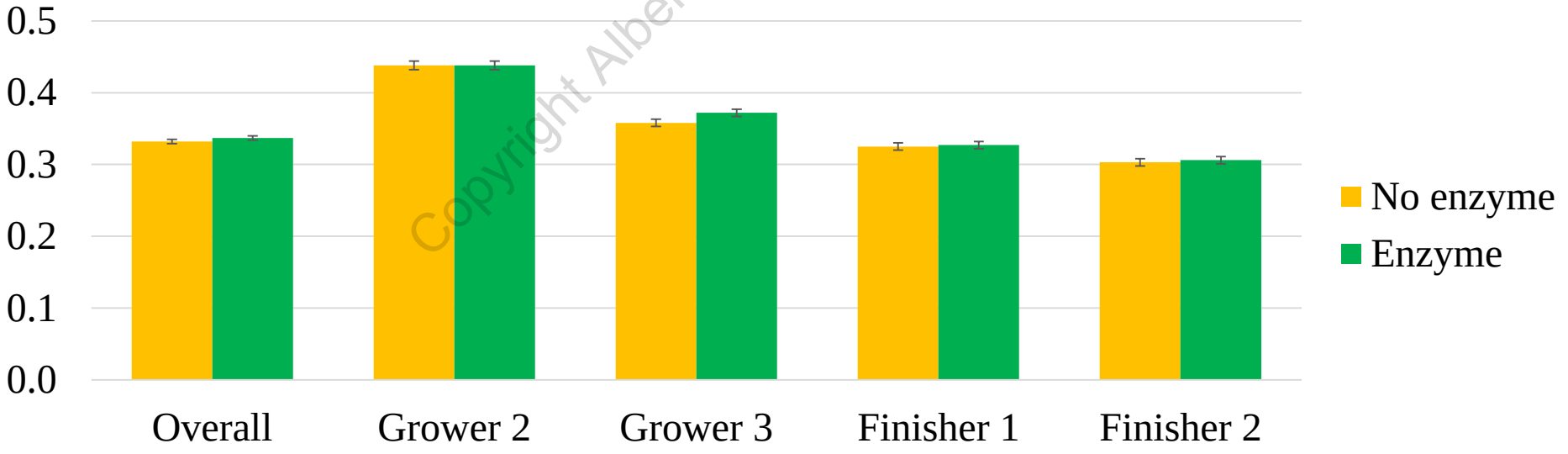
ADG, kg



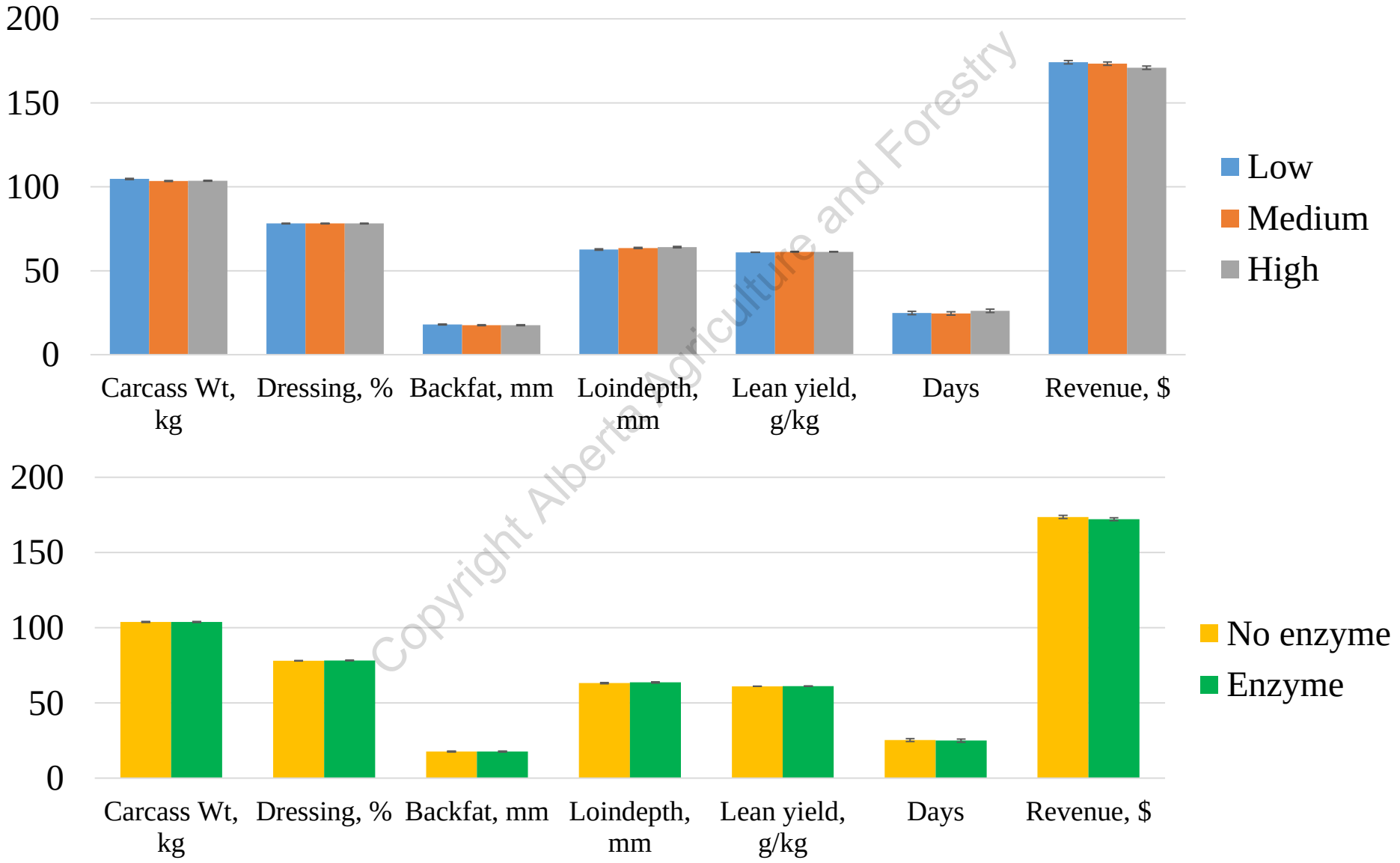


GF, kg:kg

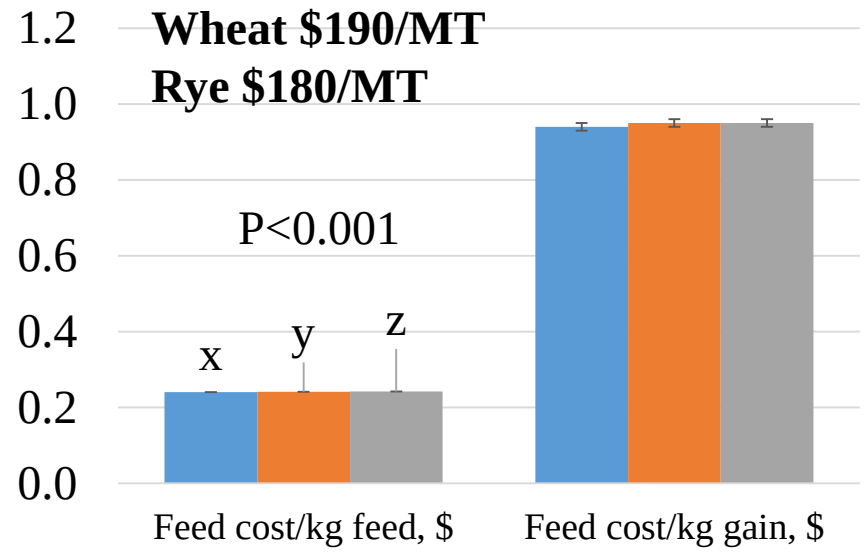


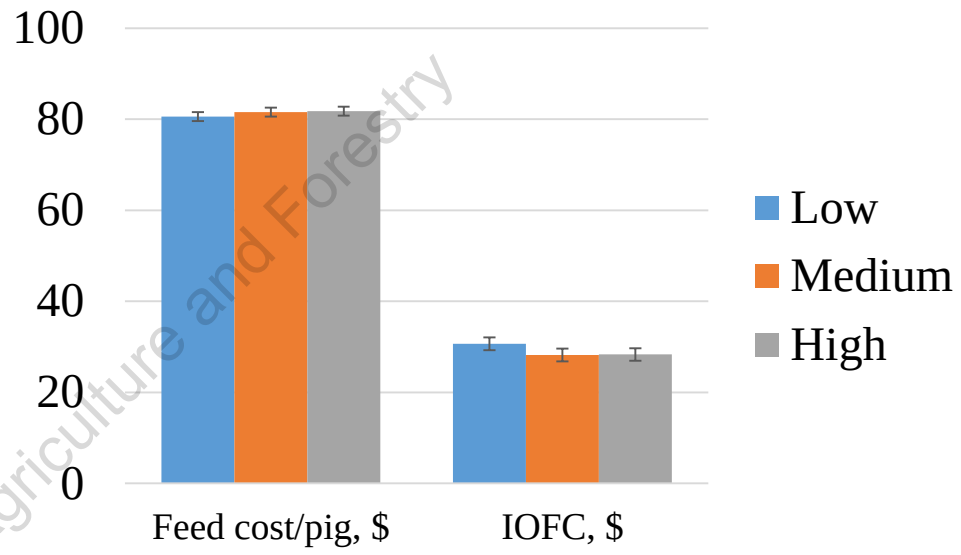


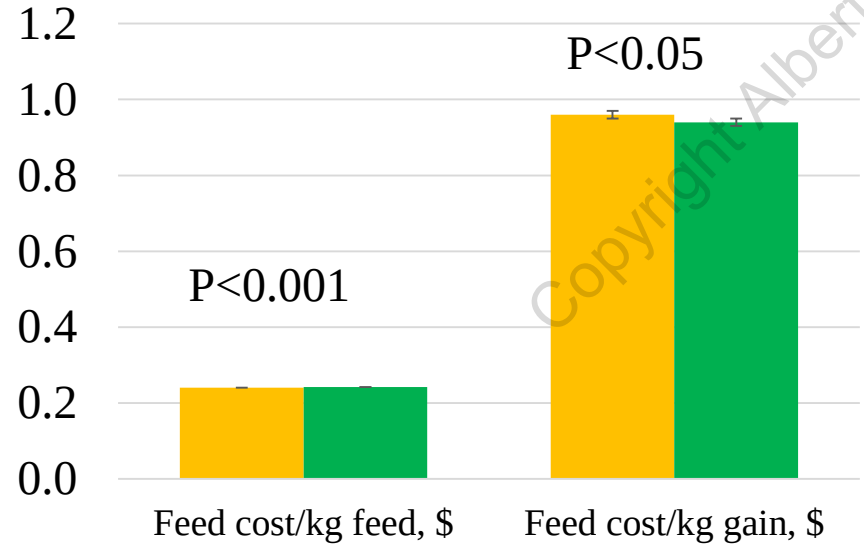
Carcass traits

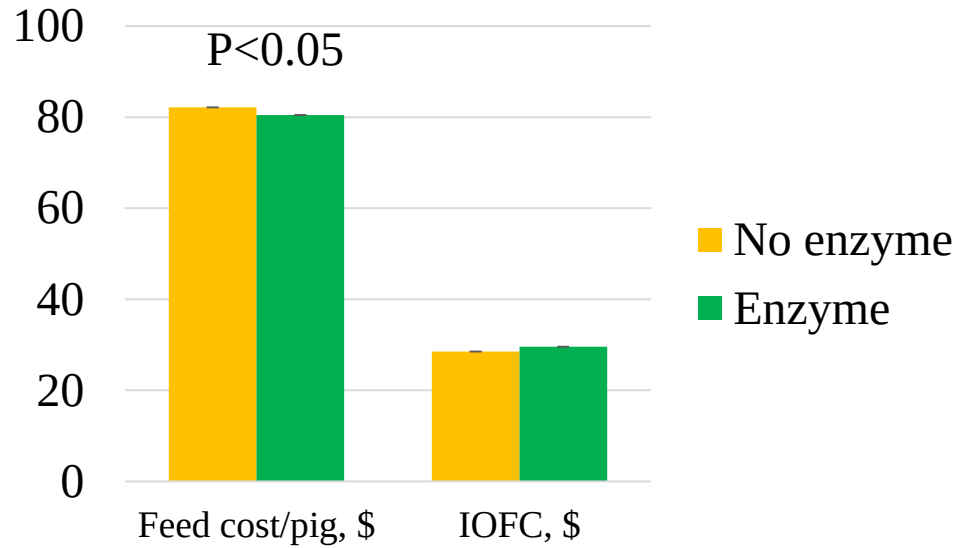


Cost









Summary

- **Increasing substitution level of rye:**
  - Reduced overall ADG, ADFI;
  - Did not affect feed efficiency, carcass traits;
  - Did not affect feed cost/kg gain, feed cost/pig, and IOFC;
- **Enzyme inclusion:**
  - Had a trend to improve overall ADG;
  - Improved feed efficiency in high rye diets;
  - Reduced feed cost/kg gain and feed cost/pig.

Thank you!
Questions?

KWS

GNC BIOFERM inc.

Sunhaven Farms

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