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Anna C. Pesta

University of Nebraska-Lincoln

Stephanie A. Furman

University of Nebraska-Lincoln, sfurman2@unl.edu

Matt K. Luebbe

University of Nebraska-Lincoln, mluebbe2@unl.edu

Galen E. Erickson

University of Nebraska-Lincoln, gerickson4@unl.edu

Karla H. Jenkins

University of Nebraska-Lincoln

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Feeding Field Peas in Finishing Diets Containing Wet Distillers Grains Plus Solubles

Anna C. Pesta
Stephanie A. Furman
Matt K. Leubbe
Galen E. Erickson
Karla H. Jenkins¹

Summary

A finishing study was conducted to evaluate the effects of feeding 0 or 20% field peas in dry-rolled corn-based diets with 0 or 30% wet distillers grains plus solubles (WDGS). There was an interaction for DMI, in which WDGS had no effect in diets without peas, but increased DMI by 2.7 lb in diets containing peas. Peas decreased DMI by 1.3 lb in diets with no WDGS but had no effect on DMI in diets containing WDGS. A peas × WDGS interaction also was observed for F:G with WDGS decreasing F:G by 12% in diets without peas, but having no impact in diets containing peas. Field pea inclusion decreased F:G by 4% in diets with no WDGS, but increased F:G by 4% when WDGS was present. The impact of WDGS on F:G was diminished in the presence of peas from 40% to 24% improvement relative to corn. However, the increase in ADG due to WDGS was similar with or without peas.

Introduction

Field pea production is increasing in the Northern Plains (NASS, 2009). The portion of the crop that does not meet quality standards for human consumption can be priced competitively enough to be utilized as a livestock feed. Previous research has focused on increasing inclusion of field peas in corn-based diets in which field pea inclusion has resulted in either no impact (2005 Nebraska Beef Cattle Report, p. 49), or a decrease in F:G. To date, no research has evaluated the impact of combining field peas with grain milling co-products

in finishing diets, even though the majority of cattle on feed are being fed diets that take advantage of the availability and relatively high feeding value of distillers grains. Thus, the objective of this study was to determine the effects of feeding field peas as a partial replacement for corn in diets that contain WDGS, and to evaluate whether the two feeds interact with one another.

Procedure

Three hundred fifty-two cross-bred steers (BW = 783 ± 59 lb) were received from multiple sources and used in a RCBD experiment at the University of Nebraska–Lincoln (UNL) Panhandle Research and Extension Center feedlot located near Scottsbluff, Neb. Cattle were bought from area ranches and fed a common maintenance diet until trial initiation. After receiving, steers were limit fed for five days, then weighed on day 0 and day 1 to determine initial BW. Animals were then blocked by BW into four blocks, stratified by BW within block, and assigned randomly to pen within strata. Treatments were assigned randomly to 32 open pens, with eight pens per treatment and

11 steers per pen. Treatments were arranged in a 2 × 2 factorial arrangement with one factor being presence or absence of 20% whole grain field peas and the other being presence or absence of 30% WDGS (DM basis, Table 1). Field peas and WDGS replaced dry-rolled corn in the diets.

Steers were implanted on day 1 with Revalor®-XS (Intervet, Millsboro, Del.) and then fed for either 140 or 159 days, depending on BW block. Cattle were harvested at Cargill Meat Solutions (Fort Morgan, Colo.), where HCW, LM area, 12th rib fat thickness, and marbling score were collected. Final BW and growth performance measures were calculated using a common dressing percent of 63%. Live final BW and dressing percent were calculated from live individual weights.

Weekly feed ingredient samples were collected, composited, and analyzed for nutrient composition. The nutrient composition (DM basis) of field peas used in this study was: 89.6% DM, 23.4% CP, 14.0% NDF, 1.2% crude fat, 49.7% starch, and 0.24% sulfur. Distillers grains used in this study was: 33.1% DM, 30.9% CP, 37.4% NDF, 10.9% crude fat, and

(Continued on next page)

Table 1. Diet composition and nutrient analysis for diets containing 0% or 20% field peas and 0% or 30% WDGS.^{1,2}

Item	0 Peas		20 Peas	
	0 WDGS	30 WDGS	0 WDGS	30 WDGS
<i>Ingredient</i>				
DRC	86.5	56.5	66.5	36.5
Field Peas	—	—	20.0	20.0
WDGS	—	30.0	—	30.0
Alfalfa Hay	7.5	7.5	7.5	7.5
Urea	1.1	—	0.4	—
Supplement ³	4.9	6.0	5.6	6.0
<i>Analyzed Composition, %</i>				
CP	11.5	15.2	12.6	18.2
NDF	10.7	19.7	12.0	21.0
Crude Fat	2.8	5.1	2.4	4.7

¹Values presented on a DM basis.

²WDGS = wet distillers grain with solubles; Peas = field peas; DRC = dry-rolled corn.

³Supplements formulated to provide: 30 g/ton of DM Rumensin® and 90 mg/steer daily Tylan®.

Table 2. Effect of field peas and WDGS inclusion on cattle performance and carcass characteristics.

Item	0 Peas		20 Peas		SEM	P-value		
	0 WDGS	30 WDGS	0 WDGS	30 WDGS		Peas ¹	WDGS ²	Peas × WDGS ³
<i>Performance</i>								
Initial BW, lb	788	786	782	783	2.1	0.04	0.77	0.48
Final BW, lb ⁴	1398	1491	1391	1481	8.1	0.32	<0.01	0.83
DMI, lb/day	24.9 ^b	25.6 ^{b,c}	23.6 ^a	26.3 ^c	0.28	0.30	<0.01	0.001
ADG, lb	4.11	4.73	4.07	4.66	0.05	0.33	<0.01	0.82
Feed:Gain	6.06 ^a	5.41 ^c	5.81 ^b	5.65 ^b	0.07	0.96	<0.01	0.003
Live final BW, lb	1486	1409	1460	1408	13.4	0.33	<0.01	0.33
<i>Carcass Characteristics</i>								
HCW, lb	881	940	877	933	5.1	0.33	<0.01	0.80
Dressing %	62.4	63.5	62.2	63.5	0.01	0.60	<0.01	0.52
LM area, in ²	13.2	13.3	13.2	13.1	0.12	0.37	0.99	0.66
12th-rib fat, in	0.60	0.65	0.60	0.67	0.01	0.40	<0.01	0.25
Calculated YG	3.54	3.86	3.51	3.95	0.05	0.54	<0.01	0.24
Marbling Score ⁵	595 ^a	576 ^{a,b}	563 ^b	588 ^a	8.7	0.30	0.72	0.01

^{a,b,c}Means in a row with different superscripts are different ($P < 0.05$).

¹Peas = P -value for the main effect of field pea inclusion.

²WDGS = P -value for the main effect of WDGS inclusion.

³Peas × WDGS = P -value for the effect of field peas × WDGS.

⁴Calculated from carcass weight, adjusted to 63% common dressing percent.

⁵Marbling Score: 500 = Small00, 600 = Modest00.

0.52% sulfur (DM basis).

Animal performance and carcass data were analyzed using the MIXED procedure of SAS (SAS Inst., Inc., Cary, N.C.) as a randomized complete block design with pen as the experimental unit. The model included the effects of block, peas, WDGS, and peas × WDGS. There was a small (6 lb) significant difference in initial BW for the main effect of peas, so initial BW was used as a covariate in the model. Two steers died and four were removed from the trial for reasons unrelated to treatment. Differences were considered significant at $P < 0.05$.

Results

Performance

A significant peas × WDGS interaction ($P < 0.01$; Table 2) was observed for DMI, in which WDGS had no effect ($P = 0.07$) in diets with no peas, but increased DMI by 2.7 lb in diets containing peas ($P < 0.01$). Peas decreased DMI by 1.3 lb in diets with no WDGS ($P < 0.01$), but had no effect ($P = 0.10$) on DMI in diets containing WDGS. As expected, WDGS

improved ADG ($P < 0.01$), which is a common observation; and peas had no effect on ADG or F:G, also in agreement with previous studies (2005 Nebraska Beef Cattle Report, pp. 49-50; 2010 Nebraska Beef Cattle Report, pp. 107-108). A significant peas × WDGS interaction ($P < 0.01$) was observed for F:G, with WDGS increasing F:G by 12% in diets without peas ($P < 0.01$), but having no impact ($P = 0.12$) in diets containing peas. Inclusion of field peas improved F:G by 4% in diets with no WDGS ($P = 0.03$), but F:G was 4% worse ($P = 0.03$) when WDGS was present. The decreased efficiency of cattle consuming the diet containing both peas and WDGS may be due to lower dietary energy density, as field peas fed in this study contained 31% less starch and 59% less fat than the dry-rolled corn being replaced.

Carcass Characteristics

A significant peas × WDGS interaction ($P = 0.01$) was observed for marbling score, as feeding WDGS decreased marbling score when peas were not included in the diet, but increased marbling score in the pres-

ence of peas. However, the magnitude of these differences was relatively small, with cattle in all treatments averaging USDA Choice quality grade. The main effect of field pea inclusion had no impact ($P > 0.30$) on carcass characteristics. There was a significant main effect of WDGS ($P < 0.01$) for final BW, HCW, dressing percent, 12th rib fat depth, and calculated yield grade. These results agree with previous work in which cattle fed WDGS gained more rapidly, and thus were fatter at equal days on feed.

Field peas can be utilized as a replacement for a portion of the corn in finishing diets. Inclusion of 20% field peas improved F:G by 4% in corn-based diets. Even though the positive impact of WDGS on gain efficiency is apparently diminished in the presence of 20% field peas, performance was acceptable when 50% corn is replaced with peas and WDGS.

¹ Anna C. Pesta, graduate student; Galen E. Erickson, professor, University of Nebraska–Lincoln (UNL) Department of Animal Science, Lincoln, Neb.; Stephanie A. Furman, research technician; Matt K. Leubbe, assistant professor; Karla H. Jenkins, assistant professor, UNL Panhandle Research and Extension Center, Scottsbluff, Neb.