



Effects of feeding chromium- and zinc- amino acid complexes on growth performance and carcass characteristics of finishing bulls fed zilpaterol hydrochloride for the last 30 days in the feedlot

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Introduction

Zilpaterol hydrochloride (ZH) is an adrenergic β -agonist which induces lipolysis and redirects the energy towards protein synthesis leading to muscle hypertrophy (Mersmann 1998; Dayton and White, 2014). Considering that muscle hypertrophy induced by ZH could increase demand for essential minerals such as chromium and zinc, the hypothesis that coupling ZH supplementation with either a high availability Cr and Zn sources, feedlot performance might be improved.

Verdugo et al. (2013) observed a tendency increase carcass weight and carcass dressing when 40 mg/kg of Zn-methionine was supplemented to cattle receiving zilpaterol hydrochloride.

Barajas et al. (2008) found that adding finishing diet with 0.2 mg Cr/kg from Cr-Met increased ADG and feed efficiency of bullocks receiving zilpaterol hydrochloride.

Objective

Evaluate main and interaction effects of feeding amino acid complexed sources of Zn (Zn-AAC; 40 mg /kg DM from Availa[®] Zn; Zinpro Corp., Eden Prairie, MN) and Cr (chromium methionine; Cr-Met; 0.20 mg / kg DM from Availa[®] Cr; Zinpro Corp., Eden Prairie, MN)

Material and Methods

Animals: 80 *Bos taurus x Bos indicus* bullocks; BW= 421 \pm 7.8 kg
Treatments were replicated into 4 pens with 5 finishing bullocks/pen

Treatments

- 1: A 90% concentrate basal finishing diet that provide 80 mg Zn /kg DM supplied from ZnSO₄·H₂O (Control; CON).
- 2: A 90% concentrate basal finishing diet that provide 40 mg Zn /kg DM supplied from ZnSO₄·H₂O, and 40 mg Zn /kg DM supplied from zinc amino acid complex (Zn-AAC; Availa Zn 120)
- 3: A 90% concentrate basal finishing diet that provide 80 mg Zn /kg DM supplied from ZnSO₄·H₂O, and Supplemental chromium to provide 0.20 mg Cr / kg DM supplied from chromium-amino acid complex (Availa-Cr[®]; Zinpro).
- 4: A 90% concentrate basal finishing diet that provide 40 mg Zn /kg DM supplied from ZnSO₄·H₂O, and 40 mg Zn /kg DM supplied from zinc amino acid complex (Zn-AAC; Availa Zn 120[®]). And Supplemental chromium to provide 0.20 mg Cr / kg DM supplied from chromium-amino acid complex (Availa-Cr[®]; Zinpro).

Treatment diets were initiated 28 d prior to starting zilpaterol hydrochloride (ZIL; 15 mg/kg BW) with ZIL fed daily for 33 d followed by a 4 d withdrawal before harvest

Statistical Analyses

ANOVA for a complete randomized block design with a 2 x 2 factorial arrangement. And two orthogonal contrasts: 1) CON vs. Zn, and 2) CON vs Cr

Literature Cited

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- Verdugo, M, B.J. Cervantes, M.A. Espino, J.A. Romo, and R. Barajas. 2013. Influence of zinc methionine and zilpaterol hydrochloride supplementation on feedlot performance and carcass characteristics of yearling-finishing bulls. *J. Anim. Sci.* Vol. 91 (E-Suppl.2):8 (abstract).

Results

Table 2. Influence of Chromium and Zinc as specific amino acid-complexes on body weight gain of finishing bullocks fed zilpaterol.

Variable	Treatments ¹				SEM ²	P-value	Main Effects			Contrasts	
	Ctrl	Cr	Zn	Cr+Zn			Cr	Zn	Cr*Zn	Ctrl vs Cr	Ctrl vs. Zn
Bullocks, n	20	20	20	20							
Pen, replicates	4	4	4	4							
Days in trial ³	37	37	37	37							
Initial BW, kg	491.62 ^a	481.49 ^b	481.54 ^b	487.92 ^{ab}	1.995	0.01	0.37	0.38	< 0.01	< 0.01	< 0.01
⁴ Final Wt, kg	548.5	554.5	554.1	552.3	4.046	0.36	0.62	0.68	0.36	0.32	0.36
ADG, kg ⁴	1.537 ^b	1.974 ^a	1.902 ^a	1.741 ^{ab}	0.114	0.03	0.36	0.42	0.02	0.02	0.03
DMI	8.989 ^a	8.565 ^c	9.154 ^a	8.653 ^{ab}	0.113	0.03	<0.01	0.29	0.74	0.03	0.33
G: F	0.171 ^b	0.230 ^a	0.214 ^{ab}	0.203 ^{ab}	0.015	0.03	0.16	0.62	0.05	0.03	0.08
NEM Obs/Exp	1.05 ^b	1.27 ^a	1.20 ^{ab}	1.16 ^{ab}	0.052	0.02	0.11	0.80	0.03	0.02	0.08
NEg Obs/Exp	1.07 ^b	1.35 ^a	1.25 ^{ab}	1.22 ^{ab}	0.064	0.01	0.07	0.65	0.04	< 0.01	0.07
HCW	345.6	349.3	349.1	347.0	2.548	0.36	0.62	0.68	0.36	0.32	0.35
HC Dressing	62.05 ^b	63.24 ^a	63.44 ^a	63.61 ^a	0.223	<0.01	0.02	<0.01	0.05	<0.01	<0.01
HCG ZH period	0.969 ^b	1.245 ^a	1.236 ^a	1.097 ^{ab}	0.082	0.05	0.42	0.48	0.03	0.04	0.05
HCG/DMI ZH P	0.108 ^b	0.145 ^a	0.135 ^a	0.125 ^{ab}	0.008	0.05	0.10	0.57	0.03	<0.01	0.05

¹ All treatments were fed to bullocks during 28 days before starting the experiment. Ctrl = Diet with only ZnSO₄ as Zn supplement and without supplementary chromium; Cr = Supplementary chromium as Cr.Met; Zn = Supplementary Zn from Availa-Zn 40 mg/kg DM substituting equivalent amount of Zn from ZnSO₄; Cr+Zn = Addition of Cr-Met and Availa-Zn.

² Standard error of the mean

³ Bullock fed zilpaterol hydrochloride (15 ug/kg BW) during 32 days and it was withdrawn 5 days before harvesting date.

⁴ Adjusted Final weight calculated as HCW0.63

Conclusion

Balancing the feeding levels of Zn-ACC and Cr-Met will be key to optimizing the overall biological response and net return of bullocks receiving zilpaterol hydrochloride.