ORGANIC-CR AS ANTI-STRESS FEED SUPPLEMENT IN TRANSPORTATION OF BEEF CATTLE

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ABSTRACT

Transportation over long distances is a significant cause of stress in animal. Under these circumstances, animal usually manifest depression and the impact on physiological condition change and loss of body weight. The objective of the research were to examine effect supplementation of organic-Cr type into beef cattle diet on animal experienced transportation stress on physiology condition, hematological and change of body weight. The experiment is conducted on 16 beef cattle transported by truck for 300 km distan ce from Malangbong to Tangerang. The experiment was arranged by Completely Randomized Design for four treatments and four replications. The treatments were R0 (= basal diet), R1 (= R0+3ppm organic-Cr resulted from alkali hydrolysis), R2 (= R0+3 ppm organic-Cr resulted from bioprocess), R3 (= R0+3 ppm organic-Cr resulted from bioremediation). The result indicated that the type of organic-Cr supplementation given at 3 ppm in diet was not influence physiological condition, hematologic and body weight at beef cattle transported for seven hours. There is indication that beef cattle given control diet (containing no Cr) showed symptom of stress as marked by bigger loss of body weight (5.41%) compared to beef cattle given diet contains organic-Cr (3.72%; 5.04%; and 4.83%), respectively.

Keywords: organic-Cr, physiologic condition, hematologic, lose of body weight, beef, transportation

INTRODUCTION

Transportation of beef cattle from fattening farm to the slaughter house brings a consequence of occurring transportation stress that may cause body weight loss. The level of body weight loss is depend on distance and time spent. Biggest percentage of body weight loss occurred at first hour transportation. Level of loss ranges from 5% to 17% of body weight prior to be transported (Santosa, 2002).

Transportation stress in livestock physiologically occurred when animal can not maintain homeostasis process that needs some metabolites like glucose, electrolyte (for example Na^+, K^+, Cl^-) and water to overcame the stress. Exhaustion during transportation, feel hungry, fear, hot temperature or aggressive behavior due to mixing with another new animals, cause exhausting of glycogen and forming of lactate acid after slaughtered (postmortem). As consequence, during transportation, livestock must be given diet as supplied of glucose source to avoid glycogen catabolism.

Chromium (Cr) is essential microelement related to insulin activity, mixed up with glucose metabolism, protein, and fat at animal tissue. As the active component from GTF, Cr are required as cofactor insulin for transported glucose from circulation into peripheral tissue (Anderson and Kozlovsky, 1985), and as GTF, Cr is essential for normal metabolism from carbohydrate, protein and fat (Mertz, 1992). Supplementation of 1 $mg.kg^{-1}$ Cr (chelate-amino acid) dry matter in diet based at adult sheep improves 30% glucose potency to be used in synthesis fat by improvement ATP-citrate liase activity. Other research shows addition Cr (chelate-amino acid) 5 $mg.kg^{-1}$ dry matter in diet contains 0.8-1.6 $mg.kg^{-1}$ dry matter increase the milk production (Yang *et al.*, 1996). Chang and Mowat (1992) report that supplementation of Cr in the form of GTF improves diet efficiency in beef experiencing stress.

The activity of GTF at transport system of glucose and amino acid improves insulin cordage with specific receptor its at target organ (Anderson and Kozlovsky, 1985). Insulin moment fastens its specific receptor, uptake cellular glucose and amino acid are easily done, and in this case function GTF improves effectivity of insulin potency. In Cr deficient livestock, giving Cr will improve the usage of glucose by insulin for muscle forming and adipose tissue (McNamara and Valdez, 2005). At addition dairy cattle cromodulin affects improve the average of metabolic and the usage of glucose, and giving Cr improves glucose intake by organ. However, molecular mechanism that occurs in the process is not completely known. According to Knowles and Warriss (2000), long transportation (18-24 hour)) can cause beef cattle loss of body weight at 3 - 11%. Despite that can also generate other loss, like the duration a period of recovery from transportation stress. Warriss *et al.* (1995) stated that it need 5 days to heal the beef cattle loss her body weight in 15 hour transportation.

Supplementation of Cr in the diet should be in form of organic-Cr, because nontoxic and 25-30% can be absorbed by the body (Chang and Mowat, 1992). Organic-Cr is complex Cr that bound in protein. Structure GTF is compiled from complex between Cr3+ with 2 acid molecules of nicotinate and 3 amino acids that is glutamate, glycine and cystein (Linder, 1992). Addition Cr into the diet will be useful, especially for improving immunity system at livestock experienced stress of transportation (Al-Mufarrej *et al.* 2008)

MATERIAL AND METHODS

Experiment was conducted to 16 beef cattle (average of body weight: 469.1±32.35 kg), transported by truck for 300 km distance from Malangbong to Tangerang, or equal to 7 hour transportation time. Beef cattle were given a diet containing 3 ppm Cr for three days prior to be transported. Type of organic-Cr that given was organic-Cr result of skin waste hydrolysis by alkali NaOH, organic-Cr result of *Saccharomeces cereviseae* bioprocess, and organic-Cr result of Duckweed bioremediation.

The research was arranged based on Completely Randomized Design (CRD) for four treatments with four replications. Treatment consist of R0 = control diet, R1= R0 + 3 ppm organic-Cr result of alkali hydrolysis, R2 = R0+ 3 ppm organic-Cr result of *Saccharomeces cereviseae* bioprocess, R3 = R0 + 3 ppm organic-Cr result of Duckweed bioremediation. Variables perceived were physiology condition, hematologic, loss of body weight and percentage of carcass. Measurement was conducted after arrive at target location. The body weight change was measured by weighing the body weight at start and after transportation.

Parameters of physiology condition were body temperature, respiration frequency, and pulses frequency. Hematologic was measured by taking blood from vena jugulars by using Li-Heparin LH (9ml) tube (Sarstedt Inc., Newton, NC). Hematological (value hematocrit, hemoglobin, erythrocyte, and leukocyte) measured by as follows: (a) value hematocrit was measured by centrifuged whole blood in capillary hematocrit contain heparin, at 3000 rpm for 15 minutes. The value of haematocrit was determined by using microcapillary reader, (b) Haemaglobulin (Hb) conducted with method Haemometer Sahli. (c) Amount of erythrocyte cell is conducted by using haemocytometer. (d) Measurement of leucocyte cells was similar to the method of erythrocyte measurement. The body weight loss was measured from difference of body weight before and after transportation.

Data that obtained analyzed with ANOVA and continued with Duncan Test (Steel and Torrie, 1981)

RESULTS AND DISCUSSION

The beef cattle that suffer stress can be seen from physiologic condition like body temperature, rate of respiration and rate of pulses. At this research, beef condition given diet contains various organic-Cr after transportation is presented at Table 1.

Table 1 summarized that effect of various organic-Cr in diet on physiological condition of beef cattle, i.e. body temperature, rate of respiration and rate of pulsus at beef were not significantly different. Body temperature of beef were ranged at 38.5-39.3°C, rate of respiration were 47.1-55.1 times per minutes, and rate of pulsus were 96.4-111.7 times per minutes, respectively, all were not

significantly different. In another words, source type Cr was not influences the physiological condition of beef cattle transported for six hours.

The value of hematologic is often used as guideline of livestock health condition. Red blood count relates to ability in transporting nutrient to all body cells, while leucocyte amount relates to the immunity, hematocrit relates to plasma ratio with blood cell, and haemoglobin relates to ability oxygen transport to whole body.

Table 1 showed that addition organic-Cr into beef diet did not influence haematologic value. Nevertheless there is indication that blood count red and hemoglobin at R0 higher than beef that given organic-Cr in their diets. This condition gives indication that beef cattle receiving control ration (R0) experienced stress that marked by hemoglobin level. Hemoglobin plays a part in oxygen supply that required by animal if they experiences of stress.

Direct effect from stress transportation consequence is decrease of body weight. Beef given diet contains Cr generally loss their body weight smaller than the beef under control diet (R0). Among type organic-Cr, in the reality organic-Cr that processed in alkali hydrolysis gives impact anti stress better than other organic-Cr. The best effects occured in the hydrolysis of organic-Cr low solubility of the company enabled the consequences occured either through initial rumen (7.18%) and also up to the abomasum (22:27%) compared with the treatment of organic produce from bioprocess-Cr and bioremediation. Meaningful this condition that organic-Cr more absorbable and exploit the body for further metabolism to gluconeogenesis process, because lower its organic-Cr that thrown away while organic-Cr- is more absorbable and exploited body at small intestine.

Transportation effect at this research was not clearly emerge, this condition were anticipated sliver its bearing with long-time transportation that conducted only seven hour. According to Knowles *et al.* (1999) there is a few/little range from to difference of cure patterns 14, 21, 26 or 31 hour transportations. Base on physiological condition that is exhaustible indicator and dehydration as seen from livestock behaviour, Knowles *et al.* (1999) suggested that continuously transportation time without rest, maximum at the most 24 hour for beef cattle. Knowles *et al.* (1999) recommend long transportation ideally 24 hour with food and drinking water available to speed up physical recovery after transportation. Addition Cr was not influences weight of beef body or score of body condition at beef that experience of heat grasp (Al-Saiady *et al.*, 2004)

Table 1. Effect of transportation on physiological condition in beef cattle

Variable	Treatment			
	R-0	R-1	R-2	R-3
Body temperature (°C)	39.0 ±0.0	38.5 ± 0.6	39.0 ± 0.0	39.3 ± 0.5
Rate of respiration per minute	48.8 ± 5.8	55.0 ± 1.0	55.1 ± 2.9	47.1 ± 4.5
Rate of pulpus per minute	103.9 ± 5.9	111.7 ± 23.1	100.0 ± 8.5	96.4 ± 18.9
Eritrocyte (x10^6 cell/ml)	842± 26	718 ± 67	821 ± 27	660 ± 84
Leucocyte (x10^3 cell/ml)	81 ± 14	69 ± 13	82 ± 19	80 ± 19
Hematocrit (%)	34,4 ± 3,1	29,0 ± 4,0	33,6 ± 3,9	34,2 ± 4,0
Haemoglobin (%)	82,5± 7,5	74,2± 4,1	79,2± 6,7	71,9± 4,2
Lose weight, (%)	5.41	3.72	5.04	4.83
Carcass, (%)	53.7	54.2	54.3	54.2

R0 = control diet, R1 = R0+3ppm alkali hydrolized organic-Cr, R2 = R0+3 ppm bioprocess organic-Cr, R3 = R0+3 ppm bioremediation organic-Cr

CONCLUSIONS

The type of organic-Cr supplement given at 3 ppm in the diet was not influence physiological condition, hematologic and body weight loss at beef cattle transportated for

seven hour. There is indication that beef given control diet (no Cr) showed stress symptom marked by bigger loss of body weight (5.41%) compared to beef cattle given the diet contains organic-Cr i.e. R1(3.72%); R2(5.04%); and R3(4.83%), respectively.

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Question:

As we know, cromium also dangerous to for the beef cattle. what is the maximum dose?

Answers:

Chromium is given limited to 3 ppm, the maximum limit is 6 ppm.