Poster 54.13

# Doses of chromium propionate in lamb diets and their effects on metabolic parameters

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## 1. Introduction

Chromium is an essential micronutrient in lipid and glucose metabolism, and its trivalent form, CrIII, enhances insulin signaling. Organic sources of chromium, such as chromium propionate, can be up to ten times more bioavailable than inorganic sources and have an effect on metabolism.

*This study was designed to evaluate the metabolic effects of two additional doses of chromium propionate.*

## 2. Methods

**Treatments:**

1. CTL: no added chromium
2. Cr0.5: CTL + 0.5 mg/kg DM
3. Cr1.5: CTL + 1.5 mg/kg DM

**Table 1**
Chemical composition of the diet of lamb with different supplementation chromium.

| Ingredients, % DM | CTL | Cr0.5 | Cr1.5 |
|---|---|---|---|
| Grass hay *Tifton 85* | 15 | 15 | 15 |
| Corn | 61 | 61 | 61 |
| Soybean meal | 20 | 20 | 20 |
| Limestone | 2 | 2 | 2 |
| Mineral Supplement[a] | 2 | 2 | 2 |
| Chromium propionate[2] | 0.0000 | 0.0005 | 0.0015 |
| Nutrients, % DM | | | |
| Dry matter | 90.21 | 90.01 | 90.28 |
| Organic matter | 6.16 | 5.88 | 6.13 |
| Crude protein | 15.09 | 15.60 | 15.15 |
| Neutral detergent fibre (NDF) | 24.14 | 26.40 | 27.12 |
| Acid detergent fiber (ADF) | 13.56 | 16.02 | 15.01 |
| Ether extract | 4.62 | 4.38 | 4.54 |
| Calcium | 12.12 | 11.10 | 12.11 |
| Phosphorus | 3.20 | 3.08 | 3.16 |
| Chromium (ppm of DM) | 2.89 | 3.98 | 4.50 |

CTL - no supplementation; Cr0.5 - 0.5 mg/kg DM and Cr1.5 - 1.5 mg/kg DM of chromium propionate.

- 29 uncastrated male lambs, 90 days old and weighing an average of 21.16 kg.
- Blood analisys: 59 days
- The experimental period: 64 days.
- The experimental design was completely randomized, and means were compared using the Tukey test at 5% probability.

## 3. Results

Table 2 . Complete blood count of lambs supplemented with different levels of chromium propionate.

| | Treatment | | | | | |
|---|---|---|---|---|---|---|
| | CTL | Cr0.5 | Cr1.5 | Mean | SEM | P-value |
| ***Metabolism*** | | | | | | |
| **Cholesterol, mg/dL** | **53.17$^{ab}$** | **44.97$^{b}$** | **58.71$^{a}$** | **52.28** | **1.97** | **0.0023** |
| Triglycerides, mg/dL | 15.83 | 15.42 | 15.10 | 15.45 | 1.20 | 0.3674 |
| **Alkaline phosphatase, U/L** | **577.74$^{a}$** | **383.20$^{ab}$** | **360.50$^{b}$** | **440.48** | **36.15** | **0.0274** |
| Fructosamine, µmol/L | 530.33 | 478.76 | 496.13 | 501.74 | 9.73 | 0.1418 |
| Glucose, mg/dL | 87.63 | 83.58 | 83.04 | 84.75 | 1.27 | 0.2187 |
| Insulin, ng/mL | 1.94 | 1.58 | 1.21 | 1.57 | 0.85 | 0.2092 |
| ***Blood count and leukogram*** | | | | | | |
| Hemoglobin, g/dL | 12.03 | 11.80 | 11.58 | 11.80 | 0.15 | 0.4228 |
| Hematocrit, % | 36.64 | 34.21 | 35.79 | 35.54 | 0.93 | 0.6081 |
| **Total leukocytes, /µL** | **6747$^{a}$** | **3520$^{b}$** | **5100$^{ab}$** | **5122** | **22.68** | **0.0126** |
| Neutrophils, /µL | 2298 | 1936 | 1489 | 1907 | 161.03 | 0.2290 |
| **Lymphocytes, /µL** | **5009$^{a}$** | **3252$^{b}$** | **3983$^{ab}$** | **4081** | **343.84** | **0.0476** |
| **Monocytes, /µL** | **424.55$^{a}$** | **184.70$^{b}$** | **177.40$^{b}$** | **262.21** | **35.13** | **0.0058** |
| Eosinophils, /µL | 51.97 | 20.80 | 35.60 | 36.12 | 7.32 | 0.3915 |
| Basophils, /µL | 64.17 | 34.80 | 34.10 | 37.59 | 7.78 | 0.0902 |
| Platelets, x10$^{3}$/µL | 507 | 517 | 554 | 526 | 30.31 | 0.8430 |

## 4. Discussion

Cr has the capacity to modulate lipid metabolism and reduce cholesterol levels (Sharma et al., 2011).

Alkaline phosphatase is an enzyme whose high concentration is associated with liver disorders, osteopathies, and the presence of lymphomas (Giannini, 2005). In contrast, animals that were fed chromium exhibited lower levels of this enzyme.

The concentration of lymphocytes and monocytes, which are indicative of the immune system process, was statistically influenced by Cr, indicating healthier animals (Seifalinasab et al., 2022).

## Conclusion

Chromium propionate supplementation at 0.5 mg/kg DM for lambs was beneficial for metabolism and the immune system.

## References

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