Impact of Different Chromium Sources on Absorption and Tissue Concentration

Dietary sources of chromium (Cr) for animals may include inorganic or organic compounds, and there are several of these forms available throughout the world. Depending on their form, all minerals will have different levels of bioavailability. The relative bioavailability of the various forms will affect the biochemical response and the economics of mineral supply (Lindemann et al., 2008).

Inorganic sources of Cr have low availability and their absorption by the pig varies between 0.4 and 2%. This contrasts with organic Cr, the absorption of which is more than ten times higher (Pechova & Pavlata, 2007). One of the main examples of organic Cr is chromium tripicolinate (CrTp).

Table 1. *Chromium Concentration of Various Tissues When Feeding Different Chromium Sources*

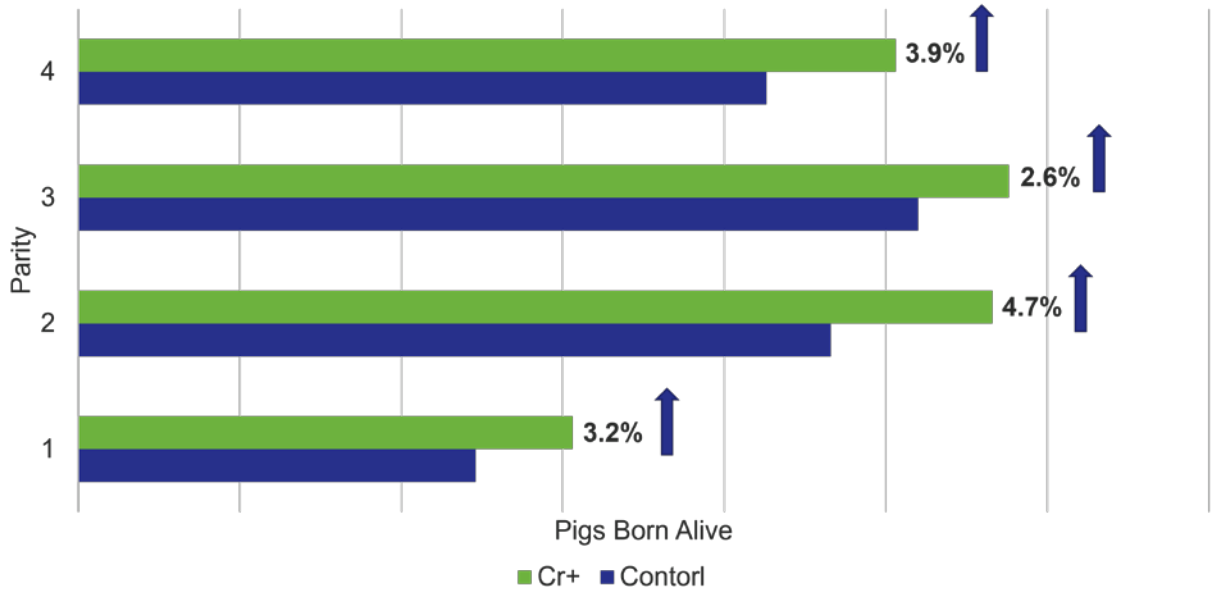
	Control	CrTripic	CrProp
Bone	27	95**	45
Kidney	425	185**	61
Liver	12	91**	21
Loin	96	151	219
Ovary	4	51**	4

** P ≤ 0.01; ** P ≤ 0.05 (Modified from Source: Lindemann et al., 2008)*

Once absorbed by the gut, Cr is bound to the plasma fraction of ß-globulins and transported into the tissues through transferrin. After reaching the blood, Cr is quickly distributed to other tissues. According to Pechova & Pavlata (2007), CrTp mainly accumulates in epidermal tissues and in the bones, liver, kidneys, spleen, lungs, and large intestine. Accumulation in muscles or other tissues seems minimal or nonexistent. Also, Anderson et al. (1997) have shown that pigs fed 0.30 mg of Cr as Cr picolinate/kg of diet had an increase of Cr levels in the kidneys and liver. The kidneys had the highest Cr concentration compared to other tissues. However, even though the kidneys have shown a higher value, especially for pigs fed with CrTp, bones constitute a more significant proportion of the body weight and provide higher storage.

Regarding sows, Lindemann et al. (2004) measured Cr levels in sows' tissues after feeding them different Cr levels. The higher the Cr level in the diet, the more it accumulated in the adrenal glands, kidneys, and liver. Additionally, Lindemann et al. (1995 and 2004), and Hagen et al. (2000) have shown that the concentration of Cr in ovarian tissue had the highest relative increase when sows were supplemented with CrTp. Hence, improvements in reproductive performance have been linked to CrTp supplementation (Hagen et al., 2000).

Figure 1. *Percent Difference of Pigs Born Alive Across Four Parities*



(Hagen et al., 2000)

Furthermore, supplementation can be affected by time and amount fed, which means the supplement period and the amount of the supplement are important to consider (Lindemann & Lu, 2019). Also, the concentration of Cr in the tissues will differ as a function of the source of Cr (Lindemann et al., 2008).

In conclusion, it has been shown that CrTp is the more bioavailable source of Cr for swine, based on its absorption by the gut and tissue deposition, proving it to be a good source of Cr for growing pigs and sows.

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