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The challenges of ractopamine use in meat production for export to European Union and Russia

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ABSTRACT

β-adrenergic agonist ractopamine is increasingly used in the swine industry due to consumer demand for leaner pork products. Ractopamine redirects nutrients to favor leanness rather than fat deposition, improves growth and carcass traits of finishing pigs. However, countries around the world are split over whether to allow the use of ractopamine in meat production. While this substance has been authorized as a feed additive in a limited number of countries, in pigs and cattle, the vast majority of jurisdictions, including the European Union (EU), China, Taiwan, Russia has banned its use on safety grounds. This legal division finds reflection into the long-standing opposition existing between countries supporting the establishment of maximum residue levels and those who oppose it within the Codex. In fact, the international debate over ractopamine bans, restrictions and maximum residue level standards have intensified and a trade war may be looming. A conflicting debate between countries has started. In this article, we discuss about the criteria of "level and not a limit", comprehensive methods used for ractopamine monitoring on every stage of the production chain, and the recommended tissue for analysis.

1. Introduction

β-adrenergic agonists (β-agonists) are widely used as bronchodilators, tocolytics and heart tonics in clinical and veterinary medicine (Antignac, Marchand, Le Bizec, & Andre, 2002). Ractopamine is classified as a β-adrenergic agonist that acts as a repartitioning agent, redirecting nutrients away from adipose tissue towards muscle deposition, resulting in substantial improvements in average daily gain, feed conversion efficiency, dressing percent and carcass lean content (Gu, Schinckel, Forrest, Kuei, & Watkins, 1991; Rikard-Bell et al., 2009). A reduction in the deposition of adipose tissue in the carcass of pigs fed the diets containing ractopamine occurs through two metabolic pathways: reduction in lipogenesis and/or increase in lipolysis. Analysis of the adipocytes isolated from these fed pigs, (Liu, Boyer, & Mills, 1989) reported lipolytic rate of these cells through the formation of glycerol and found that the reduction in adipose tissue in the carcass occurred through an increase in lipolysis. On the other hand, studies *in vitro*, in swine adipocytes measuring the rate of lipogenesis through the incorporation of glucose labeled with ^{14}C in fatty acids resulted a reduction in lipogenesis (Mills & Liu, 1990; Peterla & Scanes, 1990).

Countries around the world are split over whether to allow the use of ractopamine in meat production. Ractopamine is banned or restricted in 160 countries, including China, Russia, and members of the European Union (EU) while 27 other countries, such as Japan, the United States, Canada, Brazil and South Korea, have deemed meat from livestock fed ractopamine safe for human consumption (Pacelle, 2014).

After years of scientific and political deadlock, the Codex Alimentarius Commission, on July 5, 2012 adopted the first-ever maximum residue levels (MRL) for ractopamine hydrochloride as 10 ppb for beef and pork. This decision was a big win for the United States', Brazil's and Canada's trade interest and loss for more than 100 countries that had banned ractopamine. Brazil, one of the major beef exporters into the EU and other countries, authorized the use of ractopamine hydrochloride, in swine, in June 2012 and immediately informed the Eurasian Customs Union (ECU), an association between Russia, Kazakhstan and Belarus to maintain the pork meat export authorization. ECU communicated to Brazil that is it mandatory to put in place a "split system" and to immediately

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