



Bovine colostrum – its multiple bioactivity raises doping doubts

Head R&D Sponser Sports Food. Ing. Appl. Food Sciences, MAS Nutrition & Health ETHZ

Bovine colostrum is the so-called first milk (or also beestings) of cows right after giving birth to a calf. For the first 24 to 48 hours after birth, the cow's milk is particularly nutritious and rich in growth and immunomodulating nutrients. This milk is important to the newborn for normal growth, prevention of infection and the build-up of a proper immune system, e.g. protection from the development of allergies. Colostrum milk is not authorised for regular milk and dairy production, but for many years, it has been a very common dietary food supplement for humans. It became also quite popular with athletes some years ago.



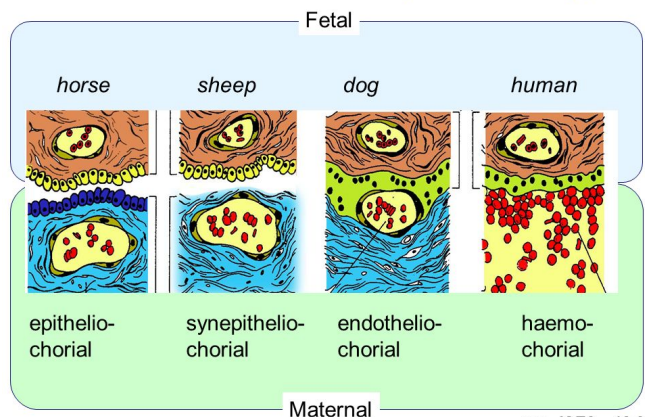
Due to a different placenta situation in cows compared to humans, calves only receive their immune system make-up after birth. Therefore, bovine colostrum is much richer in respective immunity factors than human mother's milk. Since contemporary milk cows produce much more milk than a calf ever needs, the excess colostrum milk may be commercially used for dietary supplements. Among the generally high content of natural growth factors in bovine colostrum, insulin-like growth factor 1 (IGF-1) is particularly interesting. Its highest concentration in nature is found in colostrum. Other growth factors include GH, IGF-2, TGF- β , TGF-A, FGF, GnRH, NgF, and EGF. Immunomodulating factors are, for example, immuno-globulins (IgA, IgG, and others), lactoferrin, lacto-peroxidase and cytokines. Colostrum immuno-factors are efficacious against most environmental micro-organisms and may improve or recuperate normal immune function after disease. Colostrum was used as bacteriostatic aid before the discovery of antibiotics. Colostrum also reduces gastrointestinal permeability, thereby protecting and maintaining the intestinal barrier against pathogenic germs.

Since many infections and degenerative diseases, as well as strenuous physical exercise, are associated with a reduced immune function, the interest in the use of bovine colostrum in humans for health or performance reasons is obvious. The aforementioned nutrients of colostrum also support a healthy microflora and intestinal cells, which in turn contribute to the digestion and absorption of our food. Bovine colostrum has been promoted for a number of years by renowned institutions such as the Australian Institute for Sport (AIS), and studies on athletes have shown mainly positive outcomes.

However, due to the partly hormonal nature of colostrum's composition, some provisos and fears against supplementing with colostrum have emerged recently, because of a potential doping risk, not least since some positive doping cases (true or claimed) due to contaminated food supplements made the press in the last few years. Furthermore, the World Anti-Doping Agency (WADA) as well as AIS currently discourage the intake of colostrum. However, this warning is simply based on the fact that colostrum naturally contains the growth factor IGF-1, a hormone listed on the WADA doping list as a single substance, even though there is no proof that IGF-1 in colostrum is absorbed from the intestines into the blood. Furthermore, even athletes taking 60 grams of bovine colostrum for 4 weeks showed no increase in their levels of IGF-1 (Kuipers 2002). Neither such chronic nor acute intake (doping test after 2 hours) resulted in increased IGF-1 levels in blood serum. These results could be mechanistically confirmed. The long-term intake of colostrum did indeed increase the body's genuine IGF-1 in blood serum and saliva; however, no radioactively marked IGF-1 ingested from colostrum could be found in the circulation (Mero 2002).

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Grosser's classification: placental types



see J&E6 - 10.6

In the meantime, it has been confirmed several times that neither acutely, nor after daily colostrum supplementation with 20-40 g for 4-12 weeks, increased IGF-1 plasma levels were measurable (*Davidson 2021, Jones 2019, Buckley 2003*). All these studies confirm the assumption that colostrum has a gastrointestinal effect on the intestinal flora and at most the intestinal epithelium, but no systemic effect in the circulation.

The assumption that there is a risk of a positive doping result after acute or long-term intake of bovine colostrum is, therefore, ill-founded.

I'm doping free

Sources

- Davidson et al, 2020: Oral bovine supplementation does not increase circulating insulin-like growth factor-1 concentration in healthy adults: results from short- and long-term administration studies. *Eur J Nutr* 59:1473-79
- Jones et al, 2019: The effects of bovine colostrum supplementation on in vivo immunity following prolonged exercise: a randomised controlled trial. *Eur J Nutr* 58:335-44
- Buckley et al, 2003: Effect of bovine colostrum on anaerobic exercise performance and plasma insulin-like growth factor 1. *J Sports Sci* 21:577-88
- Kuipers et al, 2002: Effects of Oral Bovine Colostrum Supplementation on Serum Insulin-Like Growth Factor-I Levels. *Applied Nutritional Investigation*, Maastricht University, The Netherlands.
- Mero et al, 2002: IGF-1, IgA, and IgG responses to bovine colostrum supplementation during training. *J Appl Physiol* 93:732-9.