Amended advice 07-2013 of the Scientific Committee of the FASFC on the presence of endogenous anabolics and or prohibited substances in food producing animals

The following questions were asked to the Scientific Committee on the presence of endogenous anabolic and/or prohibited substances in food-producing animals:

- Question 1: Among the substances being examined by the FASFC, which are those whose presence in a matrix of animal origin is suspected to have an endogenous origin (metabolism, feed, ...)?
- Question 2: In which matrices and in which animal species (categories), the presence of substances of endogenous origin can be observed?
  - Can a residue concentration be determined differentiating an endogenous origin from an illegal treatment for combinations substance/matrix/species?
- Question 3: Can the presence of prednisolone and thiouracil in matrices other than urine also have an endogenous origin?
  - If this is the case, can a residue concentration be determined which can differentiate the origin (endogenous versus illegal treatment) for combinations of substance/matrix/species?

Question 1

To answer question 1, the Scientific Committee has subdivided the substances listed in the request into three groups:

- group 1: substances with known or suspected endogenous origin at a certain level via metabolism and/or food;
- group 2: substances whose presence in a matrix of animal origin may be related to environmental or accidental contamination;
- group 3: substances for which there is no reason to suspect an endogenous origin.

Substances whose presence in an animal matrix is known or suspected to have an endogenous origin and wich can be classified in group 1 are: 17β-nortestosterone, 17α-nortestosterone, 17β-boldenone, 17α-boldenone, progesterone, 17β-testosterone, 17α-testosterone, 17β-estradiol, 17α-estradiol, zeranol, taleranol, cortisol (hydrocortisone), cortisone, prednisone, prednisolone and thiouracil.

Question 2

To answer question 2, substances in group 1 were studied more in detail for combinations substances/species/matrices. Substances of group 2 and group 3 were not studied in detail.

An extended literature study has shown that for the following substances an endogenous origin can be observed:

- in bovine urine: 17β-nortestosterone, 17α-nortestosterone, 17β-boldenone and 17α-boldenone
- in blood of bovine, pigs, poultry, sheep, goats, horses, deer and fish: progesterone, testosterone, estradiol, cortisol and cortisone
- in bovine, porcine and equine urine: prednisolone
- in bovine, porcine and sheep urine: thiouracil.

Several approaches are under development to distinguish endogenous origin and exogenous administration for certain anabolic and/or prohibited substances. The importance of a number of techniques such as the detection of biomarkers and the determination of the isotopic ratio is growing.

Approaches reported in the literature to differentiate endogenous presence from illegal treatment are presented for nortestosterone (nandrolone), boldenone, natural hormones (testosterone, estradiol, progesterone, hydrocortisone), zeranol and taleranol, prednisolone and thiouracil. Few progress is made in the study of the endogenous origin of prednisone and the actual knowledge does not allow to differentiate with certitude an endogenous origin versus an illegal treatment origin.

Results of recent experimental studies on prednisolone residues in pig urine (CER Groupe – 2014) enable to differentiate between prednisolone from endogenous origin (conform urine samples) and samples suspected of illegal treatment with prednisolone.

Question 3

The presence of prednisolone and thiouracil of endogenous origin in matrices other than urine was investigated to answer question 3. Preliminary experimental studies have shown that the liver could be an interesting matrix to show illegal treatment of prednisolone.

Thiouracil is endogenously present in the thyroid gland. Presently, the Scientific Committee does not have sufficient evidence to be able to differentiate thiouracil from endogenous origin from illegal treatment in a matrix other than urine.

In summary the Scientific Committee recommends to be careful with the interpretation of results of the presence of anabolic and/or prohibited substances with a possible endogenous origin in livestock matrices as long as threshold values are not clearly established.

The Scientific Committee encourages further research i.e. towards the development of analytical methods (eg GC-C-IRMS), biomarkers, and ratio's of substances to distinguish between endogenous origin and exogenous administration.

The full text is available on this website in dutch and in french, respectively under the section "Wetenschappelijk Comité/Adviezen" and "Comité scientifique/Avis".