Antibody characterization for effective control of recombinant somatotropin abuse?

Nathalie G.E. Smits1, Susann K.J. Ludwig1, Marco H. Blokland1, Merel A. Nessen1, Leen A. van Ginkel1, Michel W.F. Nielen1,2

Background
Recombinant bovine somatotropin (rbST) is licensed to enhance milk production in dairy cows in some countries, like the United States, but its use is banned in Europe. Effective control is therefore required. Two different approaches for control have been developed, one based on direct detection of rbST and one on detection of rbST dependent biomarkers. The best biomarker candidate for prolonged detection of rbST abuse are rbST induced antibodies.

Objective
rbST induced antibodies can only be used for screening purposes and not for detection of the presence of rbST. Will characterization of these antibodies and their antigenic binding site provide adequate structural information to use mass spectrometry to detect rbST induced antibodies? And therewith prove rbST abuse?

Characterisation of antibodies
Characterisation of antibodies, in particular the antigen binding site will:
- Give structural information of antibodies
- Allow development & synthesis of calibration standards
- Allow development of more effective immuno-affinity enrichment methods for rbST analysis in complex matrices

Challenges
- rbST induced antibodies are polyclonal
- rbST induced antibodies are not formed by all dairy cows
- rbST induced antibodies are low abundant in serum and milk
- Milk and serum are complex matrices, highly abundant in proteins

Developed detection methods growth hormone abuse

- Biomarker based bio-assay for detection of rbST abuse1,2
- 95% correct prediction of samples of rbST treated cows
- rbST induced antibodies enable prolonged detection after treatment
- Detection in serum and milk
- Indirect detection of rbST

Method for direct detection of rbST in serum
- Confirmation presence rbST
- Detection during treatment period until 2 weeks after

Characterization of antibodies by mass spectrometry?

Adapted from Zhang et al.4

Acknowledgements
This project was financially supported by the European Commission and the Dutch Ministry of Economic Affairs.

References

©RIKILT Wageningen UR
©Laboratory of Organic Chemistry
Wageningen University
Wageningen, The Netherlands
Contact: Nathalie.Smits@wur.nl
T +31 (0)317 480389
www.wageningenUR.nl/rikitl