

## **Biosensor-based detection of reduced sex hormone-binding globulin binding capacities in response to growth-promoter administrations**

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### **Abstract**

Growth-promoting agents are illicitly used during animal rearing processes and the detection of their use is limited by new compounds and dosing practices that limit the efficiency of current testing which is based on residue analysis by liquid chromatography–tandem mass spectrometry (LC–MS/MS) and gas chromatography–mass spectrometry (GC–MS) methodology. An alternative approach is to use indirect biological evidence as a screening tool to identify growth-promoter treated animals thus improving the effectiveness of residue testing through the targeted sampling of these animals. Sex hormone-binding globulin (SHBG) is a glycoprotein which binds and controls the levels of sex-hormones within the circulation. Using a biosensor assay based on measurement of binding to an immobilised 1 $\alpha$ -dihydrotestosterone (1 $\alpha$ -DHT) derivative, reduced SHBG binding capacities were detected in growth-promoter treated animals. During the course of a veal treatment regime based on repeated oestradiol benzoate, nortestosterone decanoate and dexamethasone administrations, treated male and female calves were shown to have significantly lower SHBG capacities. To assess the effectiveness of using SHBG binding capacities as a biomarker of treatment and to investigate the role of individual growth-promoter components to the SHBG capacity lowering effects, adult heifer animals were subjected to repeated doses of nortestosterone decanoate. These animals also demonstrated a reduction in SHBG capacity levels at Day 39 of the study, in contrast to oestradiol benzoate treated adult steers who were found to have unaltered levels. These findings suggest that the measurement of SHBG binding capacities using a biosensor assay has potential in the identification of illegally treated animals, particularly those exposed to androgens.

**Keywords:** Growth-promoters; Sex hormone-binding globulin; Biomarker; Biosensor