Smart data for health management

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Precision Livestock Farming (PLF) is a tool for the management of livestock by continuous automated real-time monitoring of production/reproduction, health and welfare and environmental impact. This is realized by using modern technology such as cameras, microphones, sensors around, on or in the animals to measure continuously the behaviour and responses of animals. The basics principles of PLF should take into account that all living organisms are very Complex, Individually different, Time varying in their behaviour and responses and of course they are Dynamic in all measured signals. Shortly said, living organisms are CITD systems and the monitoring tools should be able to handle this.

Since 1991 many technologies were developed using real-time image analysis, sound analysis or different types of sensors on animals. Around 2001 we started to use the name Precision Livestock Farming and since then over 1000 publications and conference proceedings have been published. Due to the fact that PLF was technology driven, most animal experts (ethologists, animals scientist, veterinarians, immunologists etc., were not aware of the strength of this technology.

The *image systems* allow to monitor in real-time (25 images per second) animal way by a top view camera above a pen with 15 fattening pigs. The same camera can measure the water intake pigs in a very accurate way as an indication of changing health status. A lameness monitor based upon camera detects the first signs of cows getting lame by monitoring each cow every time she leaves the milking robot. By using

*Real-time sound analys*es (20.000 samples per second) to detect coughing and sneezing can detect infection in fattening pigs and give a warning can go to the famer of the vet. It has been shown that this systems detects respiratory infections from 2 to 12 days before the farmer is noticing it. Sound analysis of pecking sounds allows to measure feed intake of broilers in a very accurate way as sign for changing patterns in feed intake. *Sensors* on milking cow can detect mastitis and ketosis.

The smart use of data requires real-time analyses at the lowest possible camera-, microphone or sensor level instead of sending all data higher up as often aimed for with the so called big data. It is not realistic and makes no sense to send all measured data higher up and this will be discussed. Other points to be shown are answers on the questions like ''who owns the data?'', '' Is PLF not too expensive for small

farms" and "How will PLF change the role and the work of farmers, veterinarians and stakeholders involved?" Finally we will give some clear conclusions on what we expect to happen with this technology.

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