

SESSION 3**SPECIFIC MECHANIZATION: MACHINES FOR FORAGE PRODUCTION AND DISTRIBUTION**

by the Session Coordinator and Chairman: Peter Schulze Lammers (Germany)

CONCLUSIONS**Chairman Session Conclusions**

Three oral presentations were held in this session that was followed by a discussion.

1. Improvement and future prospective of forage production by Stefan Böttinger, University of Hohenheim
2. Main drivers of customers and future trends of hay and forage harvesting machinery by Philipp Mümken, Claas Saulgau
3. Forage distribution and TMR evolution by Andrea Ugatti and Jacopo Ferlito, FarenSin Industries Breganze.

The main source of information about global forage production is on the FAO's statistics, outlining permanent grassland, but not indicating clearly the acreage for forage crops. Grazing is still used in livestock farming in less developed countries and green feed from grassland, legumes or root crops is as well a considerable nutrient supply for cattle. The entire importance of conservation for livestock feed supply accounts by area of fodder crops for 35 mil ha with a production quantity of 964 mil t recorded by FAO in 2000.

Main motivation for future developments is regarded in milk prizes which is driven by milk demand and the quantity of produced milk. The global trend of increasing number of animals per farm unit requires powerful harvesting machines with high reliability as feed crops need to be harvested in proper time. Quality of forage is highly influenced by contamination with soil particles during harvest by cutting, raking, swathing and pickup devices. As the major costs for livestock farming is on feeding with a percentage of 45 to 65% high attention is given to efficient harvest and supply to the animals. Total mixed ration provides feeding with low nutrient losses and avoids selective feed uptake of individual animals. However, 50% of the losses happens during TMR preparation requesting for better information on the process phases by sensors and recording of data.

The focus in the discussion was on harvest and on farm feed supply with specific regard to dairy cows, seen as the most relevant revenue of ruminant livestock farming. More integration of sensors into the entire process e.g. remote sensing for determination of regional and national uses of fodder crops and timing and amounts of harvest were highlighted. A lack of data and automation e.g. by

TIM was stated. Autonomous systems are seen as a future development of the process technology and are expected to be introduced in the process via cutting devices and field transport vehicles as small units. Optimization of harvest is expected by management systems aiming at more efficient use of the machinery and more timeliness of cutting at an optimum of water and nutrient content. Pollution of the fresh crop when harvested is to avoid by better and more precise cutting and pickup-devices. Quality of the forage should be sensed continuously with special regard to individual ration aiming at more effective use of the forage as a nutrient source. Entirely these measures defined as *Precision Feeding* have a great potential to improve productivity and simplify traceability.