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Climate and bedding in different barn systems

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In FreeWalk project (www.freewalk.eu) a variety of barn systems is studied. Lying space in a cubicle housing system is around 3 m2 per cow, while lying space in a bedded pack barn or on an artificial floor is 12-15 m2 per cow. Housing without cubicles or stalls is defined as Freewalk housing. "Waste" products are used as bedding material, which are expected to increase the C-content of manure and consequently the soil structure. To function as bedding, and later on as fertilizer, aerating and cultivation of these materials mixed with the animal manure takes place until the compost bedding is matured. Bedding materials examined (physical characteristics and cost) are straw, manure, sawdust, wood shavings and green garden waste. Artificial floors are built up of different layers. Climate (temperature, humidity, air velocity and light) in 44 of those barns spread through Europe is being measured at intervals as well as temperature, dry matter and bacteria composition of bedding during 2018/2019. A few barns are monitored continuously. Also, the framework of a water balance model for Freewalk housing is in development. Dry bedding is a key factor, affecting hygiene level of the bedding and animal. Optimal moisture level for a cultivated pack ranges between 40-65% (Janni et al., 2007). Drying rate is kg $H_2O/m2*day$. Insight in factors determining the moisture content of bedding is explored. Faeces and urine represent the main input. The spatial distribution of excreta in the lying and feeding alley allows estimating the quantity of water reaching the pack. Observations will be carried out on Research centers with cameras and one case farm in Italy, and trials are carried out in a Climatic chamber, using samples with different moisture content, levels of air temperature, velocity and humidity, at different pack depths. The model will be validated on basis of the field data obtained from the composted beddings. Preliminary results will be presented.