"ALL IN – ALL OUT" FINISHING UNITS FOR DAIRY BEEF PRODUCTION

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SUMMARY

"All in – All out" is a production system, where animals are moved into and out of facilities in distinct groups. Facilities are cleaned and disinfected thoroughly between groups of animals.

Ten days to three weeks old dairy calves are transported to the "all in – all out" calf rearing units. The calves are transported for a second time to the finishing units at the age of 5 – 6 months. They are slaughtered 10 – 14 months later.

The existing finishing units operate on a continuous basis. The "all in – all out" principle in the finishing units is modelled in a pilot project.

Keywords: "all in – all out", calves, finishing, beef, disease prevention, 3D modelling

AIMING FOR "ALL IN – ALL OUT" BEEF FINISHING

"All in – All out" is a production system, where animals are moved into and out of facilities in distinct groups. The aim is to reduce the spread of disease by preventing the mixing of groups. Facilities are cleaned and disinfected thoroughly between groups of animals. The "All in – all out" production method is common in pig and poultry production, but uncommon in cattle production.

Our goal is to introduce the "all in – all out" principle to bovine meat production including the finishing units. The "all in – all out" production is modelled in an EU-funded project run by the Savonia University of Applied Sciences in cooperation with a slaughterhouse company (A–Farmers Ltd.), a company producing 3D farm models (FarmiMalli Ltd), and MTT Agrifood Research Finland. The project ends in December 2007.

BOVINE MEAT PRODUCTION IN FINLAND

About 80% of the annual bovine meat production of 84 million kilograms in Finland originates from dairy breeds. About a quarter of a million cattle are slaughtered each year. Usually, ten days to three weeks old dairy calves are sold to calf rearing units through broker companies owned by slaughterhouses.

An "all-in, all-out" approach is commonly used in calf rearing units. Each batch of calves is treated as a unit from the time of arrival on the farm, until departure at the age of 5–6 months. New animals are not added to the group.

Five to six month old calves are transported to finishing units. They are slaughtered at the age of 16–18 months, when their average slaughter weight is about 330 kilograms.

FINISHING UNITS ARE NEVER EMPTY

Almost all finishing units are never empty, but operate on a continuous basis. Slaughter weighed animals leave and new calves come every month. This means that new diseases come on a monthly basis, because the animal is the ultimate source of an infection. Disease pressure cumulates year by year. Respiratory diseases cause the biggest problems.

Introducing an "all-in, all-out" system would give producers the opportunity to thoroughly clean and disinfect the entire barn before the next group, thus getting rid of the diseases in the previous batch. The producer should not deviate from the "all-in, all-out" system, because retaining some of the calves in the barn will not allow thorough cleaning, and diseases can be more readily transmitted from one group of calves to the next.

The "all in – all out" principle is easy and understandable in theory, but it has not been applied in practice, because it is not as easy in practice as in theory. Farmers need clear models and motivation to apply the principle. The continuous system is reasoned with better use of facilities, monthly money flow, lower price risk and better availability of calves. These are relevant reasons, and must be solved in modelling the "all in – all out" production.

LITERATURE REVIEW

Beef cattle feedlots are the most common way of finishing cattle into marketable beef. Beef feedlots have evolved from small family farm lots into large enterprises that market thousands of finished cattle annually. Farm feedlots in North America and so called "barley-beef "units in the United Kingdom and other European countries still account for a significant part of the feedlot industry. However, the ultimate goal for every finishing unit is to produce marketable beef at the lowest cost and in the shortest time possible (Radostits, 2001, Lechtenberg et al., 1998).

Efficiency of beef production has been improved by new knowledge of nutrition and breeding. It appears that herd health programmes are the only things that can provide significant economic benefits to the feedlot industry in the future.

Diseases are the major cause of economic loss in the feedlot. The impact of clinical and subclinical diseases on productive efficiency and economic returns may be greater than the losses associated with mortality. Infectious diseases of respiratory and alimentary tract are the most common health problems in feedlots. It is a well known fact that mixing animals from different groups or farms increase the risk of infectious disease outbreak and mortality (Radostits, 2001, Maes et al., 2004).

In disease control it is unrealistic to depend on a vaccine, an antibiotic or a single management technique (Radostits, 2001, Lechtenberg et al., 1998). Already the second edition of Herd Health Food Animal Production Medicine (Radostits et al., 1994) recommended adopting the "all in all out" principle to decrease incidence of disease. The third edition of (Radostits, 2001) includes the same recommendations.

The "all in all out" principle is unanimously recommended for beef industry by the veterinary experts, but there is not much information available about it. The principle has been applied in just a few field studies or medical trials. It is not known exactly, how long the empty period should be, nor which diseases can we get rid of with different variations of the "all in – all out" principle.

A longitudinal study of *Escherichia coli* O157 in a finishing unit showed that the source of *E. coli* O 157 was the unit itself, not new animals. Washing procedure and empty period of one day

were not sufficient to destroy *E. coli* O157 (Lahti et al., 2003). This kind of information is very important meeting the requirements for food safety and providing new quality assurance systems (Dagg et al., 2006).

There has also been growing demand from society that farm animals should be kept in ways that take into account the welfare of animals. The "all in all out" supports natural behaviour in groups without excessive stress caused by mixing the groups (Radostits, 2001; Lidfors et al., 2005).

In the pig and poultry industry the "all in – all out" is the most common type of finishing. It is one of the most important management factors in disease control (Radostits, Barnes et al 2000).

The "all in – all out" system is a protective management factor against mortality even in very common infectious disease like *Haemophilus pleuropneumoniae* infection in pigs (Hunneman, 1986). Average daily gain and feed conversion are better in pigs reared in an "all in – all out" system compared with those reared in the continuous system (Radostits, 2001).

In disease eradication programs it is essential to clean the facilities properly to succeed (Heinonen et al, 1999). Using the "all in – all out" system it was possible to raise finishers without *S. Typhimurium* infection despite the fact that the pigs were born in herds with a high level of salmonella infection in the finishing pigs (Dahl et al, 1997). Cleaning the facilities and disinfecting is a protective factor against enteric disease in grower- finishing pigs (Pearce, 1999).

MODELLING "ALL IN – ALL OUT" FOR BEEF PRODUCTION

Seven finishing units were filled in autumn 2006 with a group of calves of the same age. In addition, eight farms agreed to design their new facilities based on an "all in – all out" principle.

Possibilities and benefits of adjusting feeding by the age of the group are monitored. Work load and any practical comments given by the pilot farmers are recorded. Morbidity, mortality, average daily gain, slaughter weight, weight variation, carcass classification and meat inspection findings of the pilot farms are compared with earlier results of those farms and average results of the slaughterhouse. Finally, the total economic debit/credit is calculated. These results are expected from all pilot farms in January 2008.

Modelling of calf supply and transport, slaughter transport, prevention the risk of price variation and possible other aspects are carried out by the slaughterhouse company.

Building models are produced based on the eight pilot buildings. The models named "Finishing farms 2015" are presented three dimensionally (3D) with the new Farm Designer program developed by FarmiMalli Ltd. Building models are designed in cooperation with the building master of FarmiMalli Ltd. and the architect of the MTT Agrifood Research Finland.

The first 3D "all in – all out" models will be presented at the Tartu conference. Any comments of the models are welcome.

The final models will be presented on the web page of the project (www.vasikka.fi) in spring 2008.

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