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Clarifying Investment in a Central Ripening Storehouse for Hard Cheese

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Abstract: Decisions concerning the investment needed to replace installations in a cheese-ripening storehouse were examined in a diploma thesis. Three different versions were compared from the points of view of cost calculation and efficiency. On the basis of this analysis, maintaining the pallet system can be recommended.

Keywords: Cheese-treating facilities · Efficiency analysis · Logistics

The Thurgauische Käse-Reifungs AG (Thurgau Cheese-Ripening Co. Ltd.) was founded in September 1966. The system, with logistics and storage on special wood pallets, as well as central treatment facilities, has been maintained. The wood pallets and the treatment facilities, which were replaced 14 years ago, can be written off in the next two years. There are increasing problems with the installation, and the use of wood in the food sector is being met with a certain scepticism.

The aim of this report was to examine the logistics from the making of the cheese to its delivery to the loading platforms, and to critically compare new/other alternatives. Suggestions for the amount of investment needed to replace the cheese-treating facilities were also to be defined, and a look taken at technical feasibility and financial repercussions. A comparison of the various alternatives was undertaken by means of a cost comparison calculation and an efficiency analysis.

Three possible versions were compared. The first involves investment in cheese-treating facilities and new plastic pallets, as well as a lorry with special cheese-loading devices. During storage, the cheese can be regularly treated by means of the centralised treating facilities.

In the second version, the cheese is collected using conventional lorries with lifting platforms and covered racks. For storage, the cheese must be stacked on special storage shelves. Here the cheese can also be cleaned regularly by means of central treatment facilities.

For the third version, the logistics are handed over to an external transport company. The cheese is stored on rotating shelves and ideally not cleaned during fermentation. Only following fermentation, when the cheese has been cooled in the storage cellar, is it cleaned and turned over by means of mobile robots.

Both the cost comparison calculation and the efficiency analysis (see Table) speak in favour of maintaining the pallet system. Criteria for the efficiency analysis were as follows: cheese quality, hygiene/risk of contamination, cost, implementation time, lower work expenditure, and a possible increase of capacity. The advantages of the first version depend on the integrated logistics and storage system, which result in lower costs and less manual labour. Thanks to the centralised facilities, the cheese is more easily checked following treatment. Disadvantages are the need for lorries with special loading features and the centralised treating installation, which requires a great deal of space and, from a logistics point of view, a considerable internal effort.

On the basis of these findings, it seems wise to apply the first version, practicable within a two-year timeframe.

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[1] C. Rohrer, 'Clarifying investment in a central ripening storehouse for hard cheese', Diploma Thesis, Swiss College of Agriculture, Zollikofen, **2000**.

Table. Efficiency analysis

			Version 1	**(Pallets)**	**Version 2**	**(Shelves)**	**Version 3**	**(Rotating Shelf)**
Objective	Description	Weight	Degree of Achievement	Weight times Achievement	Degree of Achievement	Weight times Achievement	Degree of Achievement	Weight times Achievement
M	Cheese quality		yes		yes		yes	
M	Hygiene / Contamination		yes		yes		yes	
M/W	Costs	2	8	16	6	12	2	4
M/W	Implementation time	1	5	5	3	3	7	7
W	Lower work expenditure	2	5	10	1	2	3	6
W	Increased capacity	1	0	0	2	2	10	10
Total number of points				**31**		**19**		**27**

M: Mandatory objectives; M/W: Mandatory-desired objectives; W: Desired objectives

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Optimising the Addition of Transglutaminase in the Preparation of Sour Milk Products [1]

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Abstract: The addition of transglutaminase in yoghurt production was examined in a diploma thesis. In comparison to the control sample, it was possible to reduce the thermal treatment of the yoghurt milk and to entirely eliminate the addition of skim milk powder. The resulting product showed a high gel strength and only slight whey separation. The incubation temperature proved to be an important factor for success.

Keywords: Gel formation · Sensory evaluation · Transglutaminase · Yoghurt production

Transglutaminase (TG) is an enzyme which crosslinks protein at the side chains of the amino acids lysine and glutamic acid, resulting in protein polymerization (Fig. 1). Not only does the addition of TG change the rheological properties of a sour milk product, but the enzyme also has a considerable influence on its organoleptic properties, syneresis and the acidifying process.

An initial experiment clarified how far the TG can lower heating temperatures and reduce the quantity of added skim milk powder (SMP). The first experiment showed that a product very similar to the control sample (1% SMP, 92 °C/5min) is produced by heating at a temperature of 85 °C for 5 min without adding skim milk powder, but rather 17.5U TG/kg of yoghurt milk (Fig. 2). In general, the addition of TG in the first experiment led to a higher gel strength, with a tendency towards less whey drainage and shorter incubation times. The TG also changed the organoleptic properties of the yoghurt. The testers judged the

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