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ABSTRACTS OF PAPERS PRESENTED AT THE FORTY-SIXTH ANNUAL MEETING

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MANUFACTURING SECTION

M1. A study of changes in cheese protein during ripening. H. J. BASSETT, K. R. SPURGEON AND A. M. SWANSON, Univ. of Wisconsin, Madison.

Proteins present in cheese undergo degradation with liberation of water-soluble nitrogen fractions during ripening. The objective of this work has been to obtain more information about the changes in the principal protein of cheese, paracasein. The release of 4 amino acids during the ripening of a cheddar cheese has been followed.

Microbiological assays for glutamic acid, leucine, isoleucine and valine were run on the acid-hydrolyzed, water-soluble and acid-hydrolyzed, water-insoluble fractions of a cheddar cheese at the time of making and at intervals of about 3 wk. over a 15-wk. period. Kjeldahl nitrogen determinations were used to calculate a "theoretical protein" content which was used as a basis to calculate the dilution level of sample to use in the assays. For each of the amino acids, 5 levels of sample, designed to provide a potential gradient of 8 to 16 γ of test amino acid per tube, were assayed in duplicate. Results were expressed as per cent of amino acid in the calculated protein.

The ratio of these 4 amino acids to calculated protein remained very nearly the same in the acid-hydrolyzed, water-insoluble fraction of cheese as in the acid-hydrolyzed water-soluble fraction. This indicates that degradation of paracasein by the enzymes present in cheese probably is complete and not a selective liberation of certain amino acids.

M2. The order of appearance of amino acids during ripening of cheddar cheese as determined by paper chromatography. C. J. HONER AND S. L. TUCKEY, Univ. of Illinois, Urbana.

A comparison was made between cheddar cheese and a surface-ripened cheese, Muenster, of the time and order of appearance of amino acids during ripening. A porcelain-filtered water extract of the cheese was analyzed by the paper partition chromatography technique. Both two-dimensional and one-dimensional runs were made on the samples. Quantitative estimations of the amino acids liberated at definite intervals were

made. The ninhydrin-amino acid color complex was extracted and per cent transmission was determined with a model 11 Coleman spectrophotometer. Values were read off prepared standard curves.

Glutamic acid and the leucines were present in cheddar cheese at time of milling the curd. Valine was found when the cheese was 12 d. old. After 77 d., asparagine, aspartic acid, glutamine and alanine had appeared. Serine and glycine were found after 100 d. of curing. Glutamic acid and leucines predominated during the first 90 d. of curing.

In Muenster cheese, glutamic acid and the leucines were found at time of salting at pH 5.0, which was 6-8 hr. after hooping. Valine and alanine had appeared at 27 d.; after 65 d., asparagine, aspartic acid, serine, glycine, methionine, glutamic and lysine were present. Glutamic acid and the leucines predominated during the first 60 d. of curing.

M3. The proteinases of *Streptococcus lactis* and *Lactobacillus casei* and their relationship to cheese ripening. L. E. BARIBO AND E. M. FOSTER, Univ. of Wisconsin, Madison.

The characteristics of the proteinases in cheese, *Streptococcus lactis* 171 and *Lactobacillus casei* 142 were investigated for the purpose of determining their role in casein breakdown during cheese ripening. Maximum proteolytic activity for all enzyme extracts occurred above 30° C., with secondary optima between 11 and 18° C. Maximum activity of bacterial extracts occurred near neutrality, with secondary optima between pH 5.0 and 5.5. Cheese enzyme extracts had maximum activity between pH 5.0 and 5.5, with secondary optima near neutrality. All enzyme extracts were relatively stable at pH 4.5 to 7.0 for 50 hr. at 30° C.

The bacterial enzyme extracts were partially destroyed by heating at 60° C. Cheese enzyme extracts were stable at 60° C. for 1 hr. All enzyme extracts were activated by reducing agents. Acetate generally was the best buffer for enzyme activity at pH 5.1. Metal ions and anions generally were inhibitory or had no effect on the

min D (5, 10 and 30 million units) were fed daily in the form of 142F irradiated dry yeast or the oil concentrate "Viosterol." The dosage was timed so that parturition occurred near the time that the peak in blood Ca was reached, preferably 4 or 5 d. after the initiation of vitamin D feeding. To date, 23 mature Jersey cows, 15 of which had had previous milk fever histories, have been treated for 3-8 d. prepartum. Only 2 cases of milk fever have developed among the treated cows—1 cow which had received only 5 million units per day and 1 cow fed at the 10 million-unit level. Six cows, all of which had had milk fever previously, have been treated with 30 million units per day; none of these developed milk fever symptoms.

P43. Effect of environmental temperature on hunger and thirst in cows.¹ S. BRODY, A. C. RAGSDALE, H. H. KIBLER AND C. R. BLINGOE, Missouri Agr. Expt. Sta.; H. J. THOMPSON AND D. M. WORSTELL, BPISAE, U.S.D.A.

Hunger, or appetite, acts as if it were a body temperature-regulating mechanism. Decreasing environmental temperatures below 40° F. increases feed consumption, with the greatest relative increase in the smallest and least productive cows. Increasing environmental temperature above 75° F. in European and 90° F. in Indian cows decreases feed consumption. The decrease is greatest in the largest and most productive cows. The decrease in feed consumption at higher temperatures apparently is the major cause for decreased milk production, heat production (contrary to the van't Hoff rule) and pulse rate; increased endogenous catabolism is associated with increase in blood creatinine and decrease in alkali reserve (starvation acidosis), in blood cholesterol and fatty acids. With one exception, the water consumption in high-milking cows decreased and in low-milking or dry cows increased with increasing temperature. Indian cows lagged behind European cows in their critical temperatures, the amount of lag depending on milk yield and age, but at environmental temperature 105° F., the body temperature of Indian cows virtually caught up with that of European cows, suggesting that the greater heat tolerance of Indian cows is associated more with their lower productivity and greater surface area per unit weight than with greater sweating per unit surface area.

¹ Contribution from the Department of Dairy Husbandry, Missouri Agr. Expt. Sta., Journal Series no. 1251.

P44. The effect of clipping on the population of chewing lice (*Bovicola bovis*) on dairy heifers. N. N. ALLEN AND R. J. DICKE, Univ. of Wisconsin, Madison (Sunbeam Corp. support).

It was previously reported that clipping heifers infested with the chewing louse (*Bovicola bovis*) resulted in their immediate elimination from the clipped area. The work has been continued to secure further information on clipping as a practical means of control. During the winter of

1949-50, a group of yearling heifers including 5 breeds was used. Weekly population counts of lice were made by a standardized procedure which gave relative values reflecting the degree of infestation. The heifers were treated as follows: 9 heifers unclipped (control), 11 heifers clipped in early December, 6 heifers clipped Jan. 7, 8 heifers clipped Feb. 23, 8 heifers, right side clipped in early December and 8 heifers, right side clipped Feb. 23.

On the control group, population built up to a peak in February, then declined until they had practically disappeared by May. The others followed a similar pattern until clipped. In every case when an animal was clipped the population dropped to practically zero within 1-3 d. On the December-clipped group, population started building up again in early February, reaching a peak in late March, when the control group was declining rapidly. The counts remained high until late May, when the control group had become practically free of lice.

The group clipped Jan. 7 was free of lice until late February, when the population started building up. The build-up followed a trend similar to that of the earlier-clipped group, but the peak was much lower.

The group clipped Feb. 23, when population was at its peak, was practically free of lice within 3 d. and remained louse-free through May, when counts were discontinued.

The population on the unclipped sides of the half-clipped heifers followed a trend very similar to that on the control group. The trend on the clipped sides was similar to that on the heifers clipped all over at a comparable time, except that the peak of the build-up was not as high.

These groups all ran together with ample opportunity for reinfestation. In the winter of 1950-51, the heifers were divided into 2 groups, kept entirely apart from each other. One group was clipped during late November and the other was left unclipped in order to study the effect of a single clipping without opportunity for reinfestation from unclipped animals. The results of these experiments suggest that it might be possible to control the chewing louse by properly timed clipping. There has not been an opportunity to study adequately the effect of clipping on any of the sucking lice, but 3 fairly heavily infested animals are under observation.

P45. Inhibition of the proteolytic activity of trypsin by green plant extracts. K. A. KENDALL, Univ. of Illinois, Urbana.

The influence of green plant extracts from soybeans, alfalfa and ladino clover on the proteolytic activity of trypsin upon a soluble casein substrate during a standard 5-hr. incubation period has been investigated. The results indicate that an extract from each of the 3 forages has an inhibiting effect upon trypsin activity.

In the growing soybean plant the existence and concentration of the inhibitor appear to be related to seed development. The concentration of the inhibitor was found to increase significantly