

Story in Brief

The yeast, *K. fragilis*, was grown on cottage cheese whey and separated from the liquid portion of the whey. When the amino acid content of these yeast proteins was determined, it was found that they compared favorably with the composition of certain feed concentrates and with casein, the usual standard of comparison for human foods.

The Continuing Study of Wheat Pasture Flavor in Milk

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There is a continual problem in Oklahoma of off-flavored milk produced during the late fall, winter, and early spring months. One particular off-flavor has been isolated as being caused by trimethyl-amine (TMA) in the milk produced by cows being pastured on winter wheat. It is described as "fishy" in nature and is highly objectionable. Such off-flavored milk is discriminated against by the consumer and is therefore refused by the processor-handler. This results in considerable monetary loss to the dairy farmer who is forced to market the off-flavored product through processing systems where dollar return is less.

Introduction

The amount of forage consumed was definitely related to the intensity of TMA flavor in the milk of cows. However, factors other than the amount of forage consumed are responsible for part of the variation in TMA scores on milk of cows grazed on wheat pasture.

Previous studies reported by this Station showed the intensity of off-flavor as not being controlled by the time of feeding the cow her ration

of grain, silage, or alfalfa hay. Rather, the delay of feeding the silage ration until after the wheat grazing period resulted in milk being produced of greater "wheat pasture flavor" when compared to cows fed prior to grazing. This was interpreted to reflect that a hungry cow would graze a larger number of pounds of wheat forage and thereby have available more of the components that resulted in a more intense off-flavored milk.

It was observed that cows fed their grain after being milked at 5:00 A.M. and held in a loafing lot until turned into wheat pasture at 1:30 P.M. would be full and lying down by 3:00 P.M. The wheat pasture was lush at six or more inches tall. The purpose of this work was to determine whether the amount of forage consumed, by time on pasture, or by clipped forage weight could be related to the intensity of wheat induced off-flavor.

Materials and Methods

Twelve Holstein cows that had freshened approximately four months previously were selected and divided into three groups at random. All groups were fed grain at the rate of 1.5 percent of body weight, and alfalfa hay at the rate of 0.5 percent of body weight. In the first trial the respective groups were allowed to graze on Triumph-64 wheat forage for 0, 30 or 120 minutes. The cows were removed from pasture 2 hours before milking. All the cows were fed alfalfa hay after the morning milking and grain one hour before each milking.

In the second trial 4 groups of 3 cows each were fed weighed quantities of freshly clipped wheat forage to more precisely recognize the relationship between intake and TMA flavor intensity. Intakes were 0, 0.25, 0.5, and 1.5 pounds of wheat forage dry matter per 100 pounds of body weight for the four respective groups of cows. Alfalfa hay and grain were also fed in appropriate quantity to meet nutritional requirements of the cows as indicated in the first trial. The clipped wheat was fed at a schedule that would allow them to just finish eating their ration prior to the 2 hour wait before milking.

Samples were taken after milking and cooled prior to storage. Approximately 20 hours later these samples were divided into two equal parts and randomized for tasting by four trained milk flavor judges. This scoring system was 1 = no detectable wheat flavor, 2 = slight flavor, 3 = distinct flavor, 4 = strong flavor, 5 = very strong flavor. Sampling periods were approximately one week apart.

Results and Discussion

Within each group of cows grazed for a designated time there was considerable variation among cows in flavor scores average over the entire trial (Table 1). There also was a confusing effect of the "grain-feed" flavor imparted to the milk by feeding the grain ration one hour prior to milking. Later research on this subject must remove this feed flavor factor. It is apparent; however, that two hours of wheat pasturing caused an increase in the TMA intensity, compared to the 30 minute pasturing period.

Current research investigating the influence of rate of growth to TMA intensity is showing that rapid growth in early fall will produce a more intense TMA flavor that will decrease in intensity as the weather cools and growth slows. Midwinter forage during the period of very slow or no growth will produce the least amount of TMA. It would appear practical to not pasture wheat in the early fall and hold the forage in the field until after hard freezes and pasture then for controlled times with less off-flavor being probable; however, this theory has not been tested.

The results of the second trial conducted during the Spring growing season shows the increase in flavor intensity each week as the season progressed. When the ration was 1% of body weight the off-flavor was so intense as to be highly objectionable. It would appear that only a minimum of such forage can be safely grazed in the late Spring season.

More research is being conducted to determine the influence of different high producing wheat strains on the intensity of TMA production. There is continuing research to devise a practical small testing system that would accurately identify the intensity of TMA, if present, in a field sample of milk.

Table 1. Wheat flavor scores for individual cows averaged over entire grazing season.

Time grazed	Range for individual cows ¹	Overall average
(minutes)		
0	1.5-1.7	1.64
30	1.6-2.3	1.87
120	1.6-2.6	2.15

¹4 cows per treatment with 72 observations per cow.

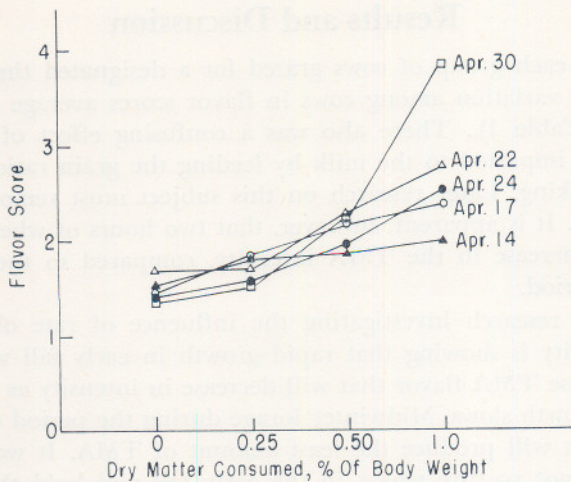


Figure 1. Average wheat flavor (TMA) intensity in milk from cows fed different amounts of wheat forage dry matter.