

CHAPTER V

CONCLUSION

In this study, factors (lactation number, stage of Lactation, feedstuff, and farm environment) contributing to volatile components and fatty acids in cow's milk produced in Thailand were studied. The analyses of volatile components were carried using headspace solid phase microextraction-gas chromatography with flame ionization detector (HS-SPME/GC-FID). The analyses of fatty acids were carried out using gas chromatography coupled to mass spectrometry detector (GC-MS).

The work also covered the optimization of HS-SPME conditions for the analyses of volatile components. We found the best extraction condition using CAR/PDMS fiber to be 20 min extraction time at 45°C. During extraction, 10 mL of milk sample was placed in a 20 mL headspace vial. The HS-SPME condition described here is appropriate for quantitative analysis of 7 target analytes (acetone, 2-butanone, butyric acid, caproic acid, caprylic acid, caproic acid and lauric acid). The HS-SPME procedure is a solvent-free method presenting major advantages, high sensitivity and simplicity.

The first factor studied was lactation number. % Milk fat increased and the color changed from white to yellowish-white in the first lactation to fifth lactation. The odor was not changed from the first lactation to the fifth lactation. The tendency for amount of volatile components in cow's milk was increased from the first lactation to the fifth lactation. In addition milk samples collected from the fifth lactation contained butyric acid and lauric acid above their flavor threshold levels. For saturated fatty acids, the amount of C14:0 increased slightly at higher lactation number. However, this trend was not observed for C16:0, C18:0 and the monounsaturated fatty acids. The amount of the polyunsaturated fatty acids (C18:2 and C18:3) were the highest in the fifth lactation, followed by the second lactation. No significant effect of lactation number was found on polyunsaturated fatty acids.

The next factor studied was lactation stage. % Milk fat increased and the color changed from white to yellowish-white in the early lactation to the late lactation but % fat in the mid lactation was lower than the early lactation. It may be due to that milk samples were collected in the summer period. The odor was not changed from the early lactation to the late lactation. The amounts of ketone compounds declined from the early lactation to the late lactation. The amounts of short-chain fatty acids (C4-12 atom) were found to be the highest in the late lactation and the lowest in the mid lactation. The trends of saturated fatty acids were similar to the trends of short-chain fatty acids. The amounts of monounsaturated fatty acids (C14:1 and C16:1) increased during the late lactation (except C18:1). The trend of C18:1 was similar to the trend of C18:0. The polyunsaturated fatty acids were produced in the mid lactation and the late lactation where the highest amount was in the mid lactation.

The third factor studied was feedstuff. % Milk fat from dairy cow fed corn silage was higher than that from dairy cow fed grass and hay. The color of milk from dairy cow fed with grass and hay was white, while the color of milk from dairy cow fed with corn silage was white to yellowish-white. The odor of milk from dairy cow fed corn silage have buttery odor more than that from dairy cow fed grass and hay. The amounts of volatile components in milk from corn-silage fed cows were more than those in milk from grass and hay-fed cows. In addition, the amount of butyric acid in milk from corn silage-fed cows exceeded the flavor threshold level. Furthermore, the milk from grass-fed cow was found to compose of more polyunsaturated fatty acids than the milk from corn-silage fed cow, in the other word, grass may contain higher amounts of polyunsaturated fatty acids than corn silage.

The last factor studied was farm environment. % Milk fat, color, and odor were not significantly different between different farm environments. The amounts of methyl ketone compounds in milk from cement house were less than those in milk from terrain house, while, the amounts of saturated fatty acids in milk from cement house were more than those in milk from terrain house. In contrast, the amounts of medium chain unsaturated fatty acids in milk from cement house were less than those in milk from terrain farm (except C18:1). It is probably due to that the biohydrogenation process in the rumen of dairy cows could occur in cement house

than in terrain house while the desaturation of C18:0 in the dairy cows could occur less in cement house than in terrain house.

In this research, the milk samples were collected at different seasons. Season is one factor contributed to milk quality. For example, milk samples were collected in the summer time. Then the dairy cow produced decreasing milk fat. For this reason, the amounts of fatty acids were found to be the lowest in mid lactation.

Future work should be focused on other factors. For instances, Seasonal factor should be studied by sampling in vary months. In order to re-checked the study of lactation stage in this work. The study of farm location has contributed to milk composition.

In this research we suggest that a good condition for good quality milk production is milk produced from dairy cows raised in terrain house, or grassland, having a wide and well ventilated area, good management for cleaning house, and fed with grass as roughage. Raw good flavor quality and high nutritive value milk is composed of low concentration of short-chain fatty acids and methyl ketone compounds and high concentration of the polyunsaturated medium-chain fatty acids which are essential fatty acids for human. It should be produced by dairy cows in second lactation and in mid-lactation stage of all lactation. The bought of this work is to improve the dairy cow farming to produce good quality milk in Thailand.