CHAPTER V

CONCLUSION

Contents of iron in heme, nonheme and soluble forms of meat, liver, heart of cow, pig and chicken and others such as fish, mussel and shrimp were determined. Large variation of these iron contents was found among species and types of tissue. Beef was the best iron source compared with pork and chicken. Iron contents of liver and heart were higher than those of meat.

Boiling and drying resulted in a substantial decrease of heme iron content and increases of nonheme and soluble iron contents of meat. The length of heat exposure time was the major factor affected the alterations of these iron contents. Freezing at -20^{o} C for 4 weeks did not affect the contents of heme and nonheme iron. But soluble iron contents of various kinds of meat were affected differently among organs and species. Soluble iron contents of beef round, pork liver, pork heart and chicken liver were increased while the iron contents of the other meat were slightly changed after freezing for 4 weeks.

The result of this study may be a useful source of data for consumers in purchasing meat with respect to be an iron source. In addition, the iron contents of meat

and the effects of processing on them from this study could be valuable for the estimation of total absorbable iron in a meal. Total absorbable iron may be calculated from total amounts of heme and nonheme iron in a meal by multiplying the appropriate absorption efficiencies according to the model which Monsen et al. (1978) proposed for predicting the amount of available iron in a given meal. Furthermore, with respect to iron content, dietary analysis tables should be thoroughly revised by introducing the data on available iron of cooked foods.

It was suggested that changes of heme, nonheme and soluble iron contents resulted from heat treatment or freezing may probably alter bioavailability of meat iron. Therefore, in order to conserve nutritive value of meat, prolong cooking should be avoided for the sake of minimizing the destruction of heme. Freezing was shown to be a better method than drying for preservation of meat as it did not affect heme iron content. The exudate of frozen meat after thawing should not be discarded due to its contents of soluble iron and other soluble nutrients.

Finally, for further knowledge in this area, study should be carried on with the following:-

1. The heme iron contents of mussel and shrimp, since the contents found in this study may not represent the actual contents because the acid-acetone extracts of mussel and shrimp were greenish yellow and reddish orange,

respectively, while the acid-acetone extracts of the other meat were red. There were a number of limitations of the method and experimental design that did not allow determination of the actual contents and identification of other pigments that may also be solubilized in the acid-acetone extracts. Thus, further study should be made for the confirmation of the heme iron contents of mussel and shrimp.

2. Owing to the lack of instruments, especially lyophilizer, and some technical problems in the analysis of ionic iron, it was not possible for this study to determine heme, ferrous and ferric iron in the water extract of meat. Therefore, further study on the forms of iron in water extract of meat should be worth.

3. Cooked blood contained high iron content may be useful in fortification or supplementation. However, a suitable preparation and vehicle for fortification need to be looking for.

4. Before the effect of heat treatment on the iron contents of meat can be stated with some confidence, it is necessary to study the influence of other cooking methods of which temperatures are higher than 100 ^{o}C such as autoclaving and frying on iron contents of meat.

5. Additional *in vivo* study should be undertaken before the effects of processing and cooking methods on meat iron bioavailability are concluded.