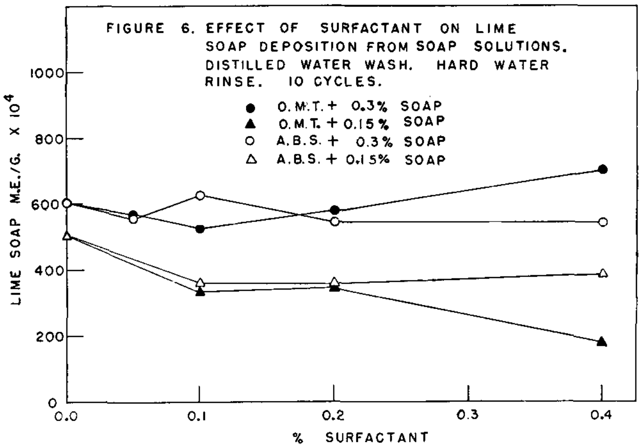

FIGURE 6. EFFECT OF SURFACTANT ON LIME SOAP DEPOSITION FROM SOAP SOLUTIONS. DISTILLED WATER WASH. HARD WATER RINSE. 10 CYCLES.

between OMT and ABS, and even when the ratio of surfactant to soap is 1.33, there is no appreciable decrease in the lime soap deposition.

When the concentration of soap is lowered to 0.15% the surfactants have a positive but relatively small effect in preventing lime soap deposition. Under these conditions OMT shows some advantage over ABS, but the advantage only becomes apparent at very high ratios of surfactant to soap.

Conclusions

These results appear to justify the following statements with regard to lime soap deposition and the influence of added surfactants.

1. Peptizing power, as exemplified by the Nessler tube test, is not a realistic index of the extent to which a surfactant will prevent firm deposition. A total concentrations of soap-plus-surfactant were held deposition resulting from a filtration effect, and this is of importance in many practical situations.

2. Clotted lime soap, in the absence of excess sodium soap or other protective agent, becomes firmly attached to the fabric. Clotted lime soap which has not been formed "in situ" does not become attached to the fabric in the presence of the non-peptizing surfactant ABS.

3. Lime soap which is peptized by the presence of excess sodium soap or peptizing surfactant does not become attached to the fabric.

4. It is very difficult to prevent the firm attachment of lime soap which is formed from sodium soap in the presence of the fabric, as during hard water rinsing. The presence of OMT or ABS in the sodium soap solution will diminish this deposition but only when the ratio of surfactant to soap is relatively high. There appears to be little practical difference between OMT and ABS in this respect, except when unusually high ratios of surfactant-to-soap are used.

Summary

A method is described for the direct volumetric estimation of lime soap on fabrics. Experimental evidence is presented to demonstrate the conditions under which lime soap may become firmly attached to the fabric. The effects of two anionic surfactant additives, oleyl methyl tauride and alkyl benzene sulfonate, in preventing firm lime soap deposition have been described.

Acknowledgment

The authors wish to express their appreciation to Miss Genevieve Poore for valuable technical assistance in carrying out this work.

REFERENCES

1. Harris, J. C., A.S.T.M. Bulletin No. 140, 76-83, May 1946.
2. Baird, W., P.B. 32565, Office of Technical Services, U. S. Department of Commerce, Washington, D. C.
3. Palit, S. R., Oil and Soap, 23, 58-60 (1946); Ind. Eng. Chem. (Anal. Ed.), *18*, 246-51 (1946).

[Received October 16, 1951]

The Composition of Fat From Icterus Swine[1,2]

L. R. DUGAN, MARJORIE PETHERAM, and H. R. KRAYBILL, The American Meat Institute Foundation, The University of Chicago

IT is not uncommon for a hog carcass to be condemned in the packing plant on post-mortem inspection. Sometimes the condemnation is based on soft and yellow-colored fat. Beadle, Wilder, and Kraybill (1) reported on the fatty acid composition of certain swine condemned because of soft yellow fat but exhibiting no manifestations of disease. They found that these fats contained approximately 10 times the amount of linolenic acid found in normal hog fat. This high proportion of polyunsaturated fatty acid was ascribed to dietary factors since it is well-known that the pig can incorporate fatty acids from its diet into its depot fats. They observed that rats fed a diet containing flaxseed deposited a heavy concentration of trienoic acids in the fat. Recently Lalor, Leoschke, and Elvehjem (5) observed that young mink, when fed a diet rich in trienoic fatty acids, developed soft yellow fat with a high trienoic fatty acid content. Shorland (7) has suggested the term "homolipoid" for fats which readily incorporate the fatty acids present in the dietary fat. While the condemnation of animals which have soft yellow fat due to dietary factors is relatively rare, there are numerous swine condemned as unfit for human use because of conditions of disease. Many of these animals are known as "icterus swine" because of the jaundiced or yellowish skin, fat, and liver. The cause of the jaundice may be infectious in nature, or it may be obstructive resulting from an obstruction of the common bile duct. Obstruction of the bile duct may in many cases be due to worm infestations. It was thought to be of interest to determine whether the yellow fat in "icterus swine" had an abnormal fatty acid composition.

Experimental

Fats from 18 animals classed as "icterus swine" were examined. The iodine values and fatty acid com-

[1] Journal Paper No. 47, American Meat Institute Foundation.
[2] Presented at 25th Fall Meeting of the American Oil Chemists' Society, Chicago, Ill., Oct. 8-11, 1951.

TABLE I
Average Fatty Acid Composition of Depot Fats From "Normal" and "Icterus" Swine

Depot Fat	No. Samples Averaged	Iodine Value	Fatty Acid Composition %				
			Arachidonic	Linolenic	Linoleic	Oleic	Saturated
Icterus Swine							
Back	17	73.3	0.65	0.80	14.77	44.74	39.04
Belly	15	73.0	0.68	0.79	12.62	50.76	35.15
Abdominal	18	64.4	0.74	0.65	12.93	40.78	44.90
Normal Swine							
Back	9	73.82	0.83	0.83	15.20	45.80	37.34
Belly	9	69.67	0.61	0.72	12.93	46.93	38.81
Abdominal	9	56.72	0.67	0.45	7.65	43.77	47.45

position are shown in Table I. The data represent values from back fat, belly fat, and abdominal fat which was primarily leaf fat but consisted in a few cases of caul fat. The fats were rendered in the laboratory by standard procedures. The iodine values were determined by the rapid Wijs method of Hiscox (4) and the unsaturated fatty acid composition by the method of Mitchell, Kraybill, and Zscheile (6), using the constants of Beadle and Kraybill (2). For comparative purposes the fats from nine normal pigs obtained at intervals over approximately a six-month period were examined in the same fashion.

Results and Discussion

The first back fat samples from "icterus swine" indicated a linoleic acid value higher than normally found in lard. All other fatty acid values seemed to be normal. However, when composition data from icterus swine were compared with the data obtained from normal animals as is shown in Table I, the values appear quite normal. The maximum variation seems to be in the linoleic acid composition from different parts of the carcass of the animal rather than between "icterus" and "normal" swine. Hilditch (3) cites numerous cases of variation of composition of pork fat with difference in carcass location. The only variation noted between "types" of animals was in the abdominal fats wherein those from "icterus swine" had somewhat higher linoleic acid content. Since the abdominal fat obtained from normal animals was mostly caul fat while that from the "icterus swine" was mostly leaf fat, the linoleic acid disparity may lie in a difference in composition of these two fats. A continuing study on the composition of carcass fats will shed more light on this variation in composition of swine body fat.

Tests on the yellow fat to confirm the presence of bile pigments were of little value. When minute quantities of yellowish substances were isolated from a chromatographic column of silicic acid, tests in solution for bile pigments were inconclusive. A spectrophotometric examination of the solutions of colored substances from the column revealed maxima which correspond to that exhibited by some of the bile pigments.

In view of the data in Table I and the spectrophotometric examination it is believed that the yellow color in the fat of "icterus swine" is caused by bile pigments and is not due to an abnormal fatty acid composition.

Summary

The fatty acid composition of depot fats from 18 "icterus swine" has been determined. These fats represented back, belly, and abdominal fats. Depot fats from comparable carcass locations in nine normal swine were examined in the same manner. The fatty acid composition of depot fats from "icterus swine" corresponds well with that from the same carcass location of normal swine. The yellow fat in "icterus swine" is believed to be due to bile pigments or similar substances deposited by the pig under the conditions of disease existing in the animal. This yellow fat (from diseased swine) differs from that observed by Beadle, *et al.* (1), in that it has an apparently normal linolenic acid content whereas they found an abnormal linolenic acid content which they ascribed to dietary effects.

REFERENCES

1. Beadle, B. W., Wilder, O. H. M., and Kraybill, H. R., J. Biol. Chem., *175*, 221-229 (1948).
2. Beadle, B. W., and Kraybill, H. R., J. Am. Chem. Soc., *66*, 1232 (1944).
3. Hilditch, T. P., "The Chemical Constitution of Natural Fats." 2nd Ed., John Wiley and Sons, Inc., New York, N. Y. (1947).
4. Hiscox, Dorothy J., Anal. Chem., *20*, 679-80 (1948).
5. Lalor, R. J., Leoschke, W. L., and Elvehjem, C. A., J. Nutr., *45*, No. 2, 183-188 (1951).
6. Mitchell, J. H. Jr., Kraybill, H. R., and Zscheile, F. P., Ind. Eng. Chem., Anal. Ed., *15*, 1-3 (1943).
7. Shorland, F. B., Nature, *165*, 766-67 (1950).

[Received November 27, 1951]

ABSTRACTS . . . . Don Whyte, Editor

• Oils and Fats

R. A. Reiners, Abstractor

Studies of Spanish decolorizing earths. I. Preliminary tests of activation and decolorization. J. M. R. de la Borbolla y Alcala, R. de C. Ramos and R. V. Ladron (Inst. esp. grasa, Sevilla). *Ion* 11, 135-41(1951). Earths from Lebrija were studied to determine the usefulness of native earths for refining olive oil. The influence of concentration of HCl and time of attack on the activation of the earths is determined. The most suitable period of contact between oil and earth is 15 minutes and satisfactory results were obtained by using 1% earth. The apparent density of the earth, the dehydration curve, and the capacity for activation are correlated. The difference between the pH of an earth determined with water and that determined with a solution of KCl is a measure of potential activity. (*Chem. Abs.* 46, 1273)

The components of the swell-fish oil. I. Solid fat in the liver oil of Spheroides stictonotus. T. Kaneko, H. Kotake and S. Senoo (Osaka Univ.). *Kagaku no Ryoiki* (J. Japan. Chem.) 3, 23-5(1949). Solid fat (approximately 2 kg.) separated from the liver oil of *S. stictonotus* (6.9 kg.) on standing at room temperature. The solid fat was purified by repeated recrystallizations from acetone and ethyl acetate. Purified solid fat, m. 50-2°, had a saponification value of 188, an acetyl value of 0, and a molecular weight of approximately 750 (freezing-point method). The fatty acids in the solid fat were examined on the basis of free acids and their methyl esters. They comprise chiefly palmitic and stearic acids in the ratio of 2:1. The main component of solid fat was considered to be stearodipalmitin. Cholesterol was identified in the nonsaponifiable matter of solid fat. (*Chem. Abs.* 46, 1273)

Oil from the seeds of Xanthium strumarium as a food product. A. S. Borozenets and A. P. Georgievskii (Khabarovsk Med.