

Meal Settlings Damage Crude Oil

Exhaustive Tests Show Advantages Gained by Removal of All Foreign Matter

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THE suddenness with which the cottonseed oil industry has been confronted with the new conditions following the recent changes in the trading rules placing a premium on "better than prime" crude oil has aroused the operators to possibilities never dreamed of before. It is rapidly changing the attitude of oil millers toward the production of their chief commodity. Formerly there had been no incentive to produce better grades of crude oil. In fact the quality of the oil has been thought by most oil millers to be something beyond their control—something "preordained" as it were. Frequently in the past there has been blending of "choice" or "prime" grades with "off" quality to produce a mixture that would pass the requirements for prime oil using the superior quality product on which there was no premium to improve the quality of the inferior, which was subject to penalty for its deficiency. Smart practice, of course.

It has been hinted that meal settlings were occasionally added to crude oil, provided the refining loss was less than 9.0%, the difference in value of the two commodities furnishing the inducement for such questionable practice. It is a well established fact that all crude oil contains an appreciable amount of meal or meats which oozes out from the presses. These impurities flow out with the oil and carry with them from seven to ten per cent of moisture. Under the

presses is located a settling trough or tank through which the oil is made to travel from two to three times the length of the trough by means of baffle partitions, passing finally through an overflow outlet into a settling tank holding the production of a twelve hour watch or twenty-four hour run. Theoretically the light suspended matter termed "settlings" is supposed to settle out, although the oil is almost constantly in motion. The result is that large quantities of moist mealy matter are pumped to the storage tank when the settling tanks are emptied. The practice of cleaning settling troughs and tanks varies in different mills. In some they are cleaned frequently, after every watch, in others daily, and in others this foul smelling, fermenting mass is allowed to remain throughout the week.

When loading tank cars it is the usual custom to pump from the bottom of tanks; and to make sure that settlings are evenly distributed, air is usually blown through the suction line, thus agitating the putrefying mass and exposing the entire contents of the tank to its contamination. Then the tank car is loaded. What happens to the settlings? Do they remain in suspension? Just as they settled out in the storage tank so they will be found on the bottom and the ends of the car a week or ten days later when the tank reaches destination. The constant jolting and jerking of cars in transit and on switch tracks tends to throw most of the settlings to the ends, but where considerable

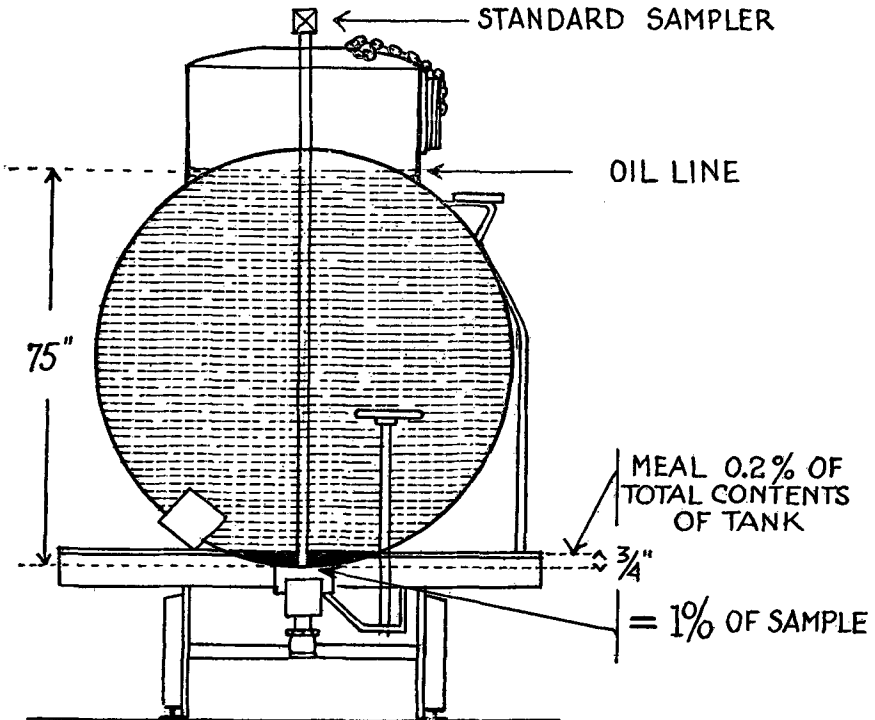
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settlings are present a layer also forms along the bottom of the tank and under the dome.

Along comes the Official Sampler with "a trier of uniform diameter of two inches" exactly in accord with the rules. He lowers it slowly into the oil until it reaches the bottom. The depth of the oil in the tank car is approximately 75 inches. Let us assume there is a $\frac{3}{4}$ -inch layer of settlings on the bottom of the tank—this three-fourth ($\frac{3}{4}$) inch represents then 1.0% of the 75 inches of sample drawn. The sample contains then 1.0% of meal settlings if drawn properly. But did you ever consider the relation of one inch on the bottom of the tank to the total cubical contents of the entire tank?

It is but one-quarter of one per cent, approximately. Therefore, a $\frac{3}{4}$ -inch layer of settlings on the bottom of the tank represents 1.0% of the sample, whereas it is in reality less than two-tenths per cent of the entire contents. Is it any wonder then that loading and destination samples frequently don't agree?

Now what becomes of the sample when drawn? Let us assume that it is analyzed immediately by the buyer, and if the seller acts promptly, is analyzed within three or four days by his chemist. The settlings are present. What is the result? The loss is not increased 1.0% corresponding to this per cent of settlings present, but from FOUR to SEVEN times the actual amount



Graphic representation of exaggerated effect upon standard sample of a small percentage of meal in the bottom of a tank car of oil

present according to the authority of some of the ablest refiners and chemists in the business and backed by loads of experimental data.

On the other hand let us assume that the seller fails to act promptly when notified of the claim of the buyer. Perhaps there is quibbling over the selection of the chemist or some other technicality. The sample reposes in a comfortably warm place in the laboratory or office. After several weeks delay word comes to send the sample to the chemist. What is the result? The free fatty acid has gone up tremendously—there is a big increase in refining loss and the color is several points darker, and all on account of a little messy meal settlings, that should not have been present in the first place. In these “prohibitous” times every one knows the effect of yeast in “homebrew.” The meal settlings, always containing water, which is allowed to find its way into pure, clean cottonseed oil performs the same humble role as the yeast in “homebrew,” except that the only “kick” in it is against the one who allows it to happen, and perhaps the poor chemist.

If you doubt what happens when meal and moisture are present, just try the experiment of moistening a half tumbler of good sound meats or meal with water and set in a nice warm place for a week or ten days. **RESULT:** — “Attar of Roses”—not much!

Crude cottonseed oil “free from water and settlings” as now produced does not exist, and yet the buyer knows that the seller pays the penalty for his folly or negligence and very charitably does not enforce this provision of the rules.

Crude cottonseed oil is a perishable commodity. When free from

moisture and settlings it can be safely stored and will undergo very little change for an indefinite time. Besides free fatty acid, it contains certain mucilaginous, resinous, albuminoid matters which undergo changes that break down the neutral oil and increase the free fatty acid content. For this reason it is never advisable to store crude oil as such for long, extended periods.

As already pointed out and emphasized, the presence of moisture and settlings acts as an accelerator to these changes, and with favorable temperature conditions the increase in fatty acid and refining loss is sometimes very rapid.

In order to obtain data on the deterioration of crude oil and the effect of moisture and settlings upon its keeping qualities, this laboratory conducted a series of experiments using clear, well settled oil as the basis, and portions of the same oil to which were added different amounts of moist cotton seed meal and all of the samples stored under identical conditions, with the analysis of each sample being made every week. The results are so obvious that extended comment is unnecessary and as a practical illustration of the effect of meal settlings upon crude oil should convince the most skeptical. Careful study of these tables will prove interesting.

MORAL:—Keep meal settlings out of crude oil!

Will Buy

Oily or Greasy Waste Materials (Fullers' Earth; Rejected Seeds or Beans; Oil Cake; etc), Preferably containing Coconut or Palm Kernel Oil, Animal Fat or Tallow.

Address: Box D14,
OIL & FAT INDUSTRIES

First Series of Tests to Determine the Keeping Quality of Well Settled Crude Cottonseed Oil and the Effect of Definite Amounts of "Settlings" Upon the Free Fatty Acid Content.

Effect of Meal Settlings on F. F. A. Content of Crude Cottonseed Oil

	Sample No. 1		Sample No. 2		Sample No. 3		Sample No. 4		Sample No. 5	
	Settled Oil	2% Meal Added	Settled Oil	2% Meal Added	Settled Oil	2% Meal Added	Settled Oil	2% Meal Added	Settled Oil	2% Meal Added
	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %	F.F.A. %
At start	4.90	4.90	9.00	9.00	15.00	15.00	20.70	20.70	23.00	23.00
1st week	4.80	4.80	9.20	8.90	16.80	16.40	21.40	20.50	23.10	22.00
2nd week	4.90	5.10	9.20	9.60	16.80	16.80	21.40	21.00	23.10	22.40
3rd week	4.90	8.20	9.30	11.50	17.00	20.40	21.50	27.00	23.10	25.60
4th week	5.00	12.90	9.30	16.30	17.00	22.80	21.50	32.50	23.20	32.20
5th week	5.00	15.50	9.30	19.50	17.00	25.00	21.50	34.20	23.10	38.50
6th week	5.10	18.00	9.40	24.00	17.10	28.50	21.60	39.50	23.50	42.00
7th week	5.10	19.40	9.40	26.20	17.10	30.00	21.70	41.00	23.30	44.00
8th week	5.10	21.20	9.40	27.50	17.20	31.00	21.70	42.00	23.60	45.50
9th week	5.20	23.00	9.50	30.00	17.40	32.50	21.70	42.50	23.90	46.70
Maximum Increase of F.F.A.	.30	18.00	.50	21.00	2.40	17.50	1.00	21.80	.90	23.70

Second Series of Tests to Determine the Keeping Quality of Well Settled Crude Oil and the Effect of Definite Amounts of "Settlings" Upon Free Fatty Acid, Refining Loss and Color

	Sample			Sample			Sample			
	Settled Sample			Meal has been added			Meal has been added			
	F.F.A. %	Loss %	Red %	F.F.A. %	Loss %	Red %	F.F.A. %	Loss %	Red %	
<i>First Sample—F.F.A. 2 to 3 per cent.</i>										
At start	2.60	9.00	6.8	2.65	10.05	7.5	2.65	12.00	8.4	
1st week	2.60	8.75	7.2	2.90	9.95	9.0	3.00	12.80	10.5	
2nd week	2.65	9.05	7.6	3.30	10.85	10.2	3.70	13.60	10.6	
3rd week	2.65	9.60	8.7	3.60	11.40	10.8	4.70	15.05	11.0	
4th week	2.65	9.45	8.4	4.00	12.85	9.7	5.20	17.05	11.2	
5th week	2.65	10.60	8.7	4.95	16.60	9.6	6.10	20.80	10.8	
<i>Second Sample—F.F.A. 3 to 4 per cent.</i>										
At start	3.75	12.45	9.4	3.75	14.00	9.4	3.75	14.40	11.0	
1st week	3.75	12.05	9.5	3.95	12.60	11.0	4.00	14.85	11.0	
2nd week	3.80	13.15	9.3	4.25	13.00	10.5	4.60	17.05	10.2	
3rd week	3.80	13.30	10.0	4.80	15.25	10.9	5.50	19.20	11.1	
4th week	3.80	14.25	10.0	5.30	16.10	10.6	6.60	20.85	11.1	
5th week	3.80	15.00	10.4	6.60	18.55	12.1	8.00	24.65	11.5	
<i>Third Sample—F.F.A. 4 to 5 per cent.</i>										
At start	4.75	14.85	10.2	4.75	15.60	11.0	4.75	16.45	12.3	
1st week	4.70	15.30	10.6	4.85	15.90	11.8	4.90	16.95	13.2	
2nd week	4.75	14.80	11.3	5.20	16.95	12.2	5.40	18.50	13.1	
3rd week	4.80	15.00	11.4	5.85	20.15	12.2	6.40	21.55	13.0	
4th week	4.75	15.70	11.8	6.50	21.35	13.0	7.50	23.45	14.5	
5th week	4.90	16.90	11.7	7.30	21.75	15.4	9.00	26.30	15.1	
<i>Fourth Sample—F.F.A. 5 to 6 per cent.</i>										
At start	5.60	18.20	12.0	5.60	18.45	12.3	5.60	19.50	13.4	
1st week	5.60	17.50	12.7	5.75	19.55	14.8	5.80	21.40	16.3	
2nd week	5.65	17.35	13.0	6.10	20.15	14.3	6.35	21.85	14.9	
3rd week	5.70	18.70	13.4	7.10	24.00	16.0	8.40	27.25	16.2	
4th week	5.70	17.60	14.2	7.80	25.95	16.0	9.95	28.10	16.7	
5th week	5.70	17.40	13.3	6.50	24.60	15.5	7.30	26.35	15.7	
<i>Fifth Sample—F.F.A. 6 to 7 per cent.</i>										
At start	6.65	21.10	13.5	6.60	21.90	14.0	6.50	23.70	14.4	
1st week	6.65	22.45	16.0	6.80	24.45	16.0	6.80	25.25	17.5	
2nd week	6.70	21.10	14.1	7.30	24.45	15.8	7.90	26.55	16.4	
3rd week	6.70	22.00	15.3	8.40	27.60	16.8	9.90	31.15	17.2	
4th week	6.80	24.35	13.6	10.00	32.25	16.4	12.30	35.50	17.7	
5th week	6.90	21.80	14.4	11.80	34.35	15.7	14.75	36.35	18.4	
<i>Sixth Sample—F.F.A. 7 to 8 per cent.</i>										
At start	7.60	22.15	21.2	7.50	24.00	22.2	7.40	26.85	25.3	
1st week	7.60	24.85	24.5	7.70	28.90	27.0	7.70	29.05	29.0	
2nd week	7.65	24.25	21.0	8.10	28.90	26.0	8.30	29.30	28.0	
3rd week	7.70	24.75	23.4	8.80	29.95	28.0	9.40	31.40	32.0	
4th week	7.70	25.60	22.5	9.60	29.55	30.0	10.40	31.20	32.0	
5th week	7.90	24.85	22.0	10.80	30.50	30.0	11.80	31.95	34.0	
<i>Seventh Sample—F.F.A. 8 to 9 per cent.</i>										
At start	8.70	24.15	21.5	8.45	25.80	23.0	8.30	29.20	25.0	
1st week	8.60	25.70	21.5	9.00	29.80	23.0	9.00	30.20	26.0	
2nd week	8.60	25.60	20.0	9.40	29.50	24.2	9.70	30.70	26.0	
3rd week	8.70	25.55	22.0	10.20	31.05	29.0	10.90	31.80	30.0	
4th week	8.80	27.25	22.0	11.30	35.50	28.0	12.80	36.00	31.0	
5th week	8.90	25.75	24.0	12.75	35.45	28.0	16.30	40.75	33.0	
<i>Eighth Sample—F.F.A. 9 to 10 per cent.</i>										
At start	9.45	27.00	27.0	9.35	28.50	29.0	9.20	30.00	30.0	
1st week	9.45	28.20	29.5	9.60	30.20	33.0	9.60	31.95	35.0	
2nd week	9.40	27.20	30.0	9.90	30.60	33.0	10.20	31.45	39.0	
3rd week	9.50	26.90	34.0	10.60	32.35	40.0	11.90	32.50	52.0	
4th week	9.60	28.60	31.0	11.60	34.45	38.0	13.80	37.70	50.0	
5th week	9.80	27.45	31.0	13.20	35.20	45.0	16.50	40.50	54.0	