Improving Soy Bean Oil Color

By R. T. ANDERSON
THE V. D. ANDERSON CO., CLEVELAND, OHIO

FUNDAMENTAL improvements in Expeller design in recent years have resulted not only in tripling capacities and materially increasing pressing efficiency, but also on some materials they have created problems in oil quality.

On soya beans, for instance, the old Anderson No. 1 type Expeller had a capacity of about 200 bushels of beans in 24 hours when producing cake averaging 4½ to 5% oil content. At this rate it required about 15 HP., and produced a crude oil averaging 20 to 21 red and 100 yellow. The temperature of the barrel or cage of the Expeller when doing this work ranged from about 200 to 230° F. when the temperature of the heated beans entering the barrel was held at 270° F.

Under the same conditions and on the same kind of beans, the Anderson R B Expeller, an improved type which first appeared about ten years ago, had a capacity of about 400 bushels of beans in 24 hours when leaving 4½ to 5% oil in the cake, and at this rate it required about 25 HP. The crude oil averaged 35 to 40 red and 130 yellow, while the barrel temperature ranged from 270 to 320° F. Thus, with an increase of about 100° in barrel temperature and double the capacity, the oil color nearly doubled. Another factor affecting the oil color is the amount of foots squeezed out of the barrel with the oil, and this necessarily increases with the higher pressures and capacities used in the modern Expellers.

Coming to the most modern Expeller of all, the Super DUO, it was found to have a capacity of about 600 bushels of beans in 24 hours when leaving 3.8 to 4.5% oil in cake. At this rate it consumes about 45 HP. and the oil color ran up to 40 to 50 red and 150 yellow, while the barrel temperature was found to be from 320 to 350° F.

Thus the Super DUO, having three times the capacity of the old No. 1 Expeller and leaving about 1% less oil in the cake, produced oil of somewhat more than double the red color. As this color is objectionable for some uses, experiments were made to find out how it could be reduced.

The high temperatures measured in the barrel are due partly to the heat in the material entering the barrel and partly to the frictional heat developed as the material slides forward under high pressure between the worm shaft and the barrel. Since the temperature of the tempered beans entering the Expeller barrel cannot be reduced under 270° F. without affecting the pressing efficiency, it was obviously necessary to control the temperature of the material under pressure.

Using a hollow worm shaft and circulating cooling water through it had no effect on either the barrel temperature or the oil color. Blowing large volumes of cool air against the barrel did materially reduce barrel temperature and improve oil color but created a problem in handling the vaporized oil.

Patents have been applied for, covering the cooling of the barrels by the various means outlined.

Finally the practice of pumping cool oil over the Expeller barrel was adopted, and this proved very effective in controlling barrel temperature and reducing color. By this means both the temperature and oil color were brought down to approximately the same range as for the old No. 1 Expellers, and this oil was regarded as of very choice quality by experts and customers to whom it was submitted.

The apparatus necessary for this operation and the method of using it is quite simple. The oil being produced by the Expeller is allowed to accumulate and form a reservoir in the Expeller bed. From this reservoir the oil, freed from the coarser foots, is pumped through a heat exchanger and sprayed over the barrel in such a manner that it not only cools the barrel effectively, but also keeps it continually washed free from foots.

The efficiency of the cooling is reflected in the cake moisture, which averages about 0.9% when not cooling and 2.0 to 2.5% when cooling, with the same moisture in material entering the barrel.

The oil content of the cake has been found to be about 0.5% lower when cooling the barrel, this being due apparently to the fact that a higher pressure is generated, as evidenced by the slightly higher power consumption at the same capacity.

Summary

1. Increased heat developed in the Expeller barrel as the capacity and efficiency have been increased in the modern types of Expellers has resulted in increasing the color of crude soya bean oil to a point where it is objectionable for some uses.

2. Reducing and controlling the barrel temperature by spraying cool oil over it resulted in materially reducing the color of crude soya bean oil.

Effect on Refining Results of Mixing Expeller and Hydraulic Cottonseed Oil

By G. W. OWEN
THE V. D. ANDERSON CO., CLEVELAND, OHIO

FOR MANY years it has been known that crude cottonseed oil produced by the Anderson Expeller process contains relatively large amounts of free gossypol, as compared with the small amounts of gossypol in oil produced by the hydraulic press process. Although the amount of gossypol in Expeller oil is greater when using the old cold pressing process on whole seed, still it exists in quantities ranging from 0.4% to 1.2% in oil produced by the modern hot pressing process, either from whole seed or from the separated meats. Hydraulic press oil, on the other hand, ranges from none to about 0.2% as determined by Royce's pyridine-aniline method.

In the alkali refining of crude cottonseed oils, the foots from Expeller oils usually separate in a hard, compact form containing relatively little entrained or emulsified neutral