CO1970QUA05

THE EFFECT OF RAPESEED QUALITY ON PROCESSING PROCEDURES

By R. Simmons
Western Canadian Seed Processors Ltd.
Lethbridge, Alberta.

If we are to discuss the effect of rapeseed quality, we must agree on which quality factors are involved. By definition quality is described under the Canada Grain Act. No. 1 Canada rapeseed must weigh 52 lbs. per bushel and be reasonably sound, cool, and sweet. It may not contain over 3% damaged seeds, including not over 0.1% heated seeds and it must be of good natural colour. It may not contain more than 1 percent of other seeds.

This is a broad definition of quality but it does not narrow down the quality factors which will affect or control the quality or saleability of the resulting rapeseed products.

Crushing plant operators and refinery operators using crude rapeseed oil must be aware of the following quality factors in their rapeseed supplies which they accept for processing. Some of these are beyond the control of the operators.

1. The quality of the chemical composition of the rapeseed accepted for processing is basically inherent in the types and varieties of rapeseed produced. The fatty acid content, and the protein content and percentage, may be varied by climate, fertility and growing conditions but basically the processor must accept the chemical quality of the seed received. The processor is required to vary and adopt techniques to protect these chemical qualities of the seed received.

2. The quality of the physical state of the rapeseed accepted for processing is generally beyond the control of the processors. However, the processors have to anticipate adjusting procedures and techniques to maintain maximum production as well as preserving the quality of seed received.

The physical condition of the seed will be determined by:

(a) The degree and type of maturity.

(b) Degree of mechanical harvest and handling damage.

(c) Weathering during harvest.

(d) Storage or handling damage.

(e) Growing conditions.

3. The quality of the resulting products will be varied by the percentages and types of impurities and included material which may remain with the rapeseed at the time of processing. Undesirable fatty acids, enzymes, protein or protein-like compounds and fibre may be unwittingly added to the resulting products by not removing or properly processing these impurities.

The degree to which these three major quality factors can affect the operation of a rapeseed processor will depend upon the variations in the conditions which may control these quality factors. Some of these controlling factors may be listed under the following headings.

(a) Environmental, which includes: the production zone, the altitude, the temperature variation, frost-free period, harvesting conditions. Canadian rapeseed supplies are drawn from all five major soil areas ranging from Manitoba to Northern Alberta. These areas include altitudes from 2000 to 4000 feet above sea level and zones having rainfall variation from less than 10" to over 20" during the growing season. The frost-free period varies from 80 days to 171 days in this rapeseed production zone. Harvest conditions can vary from extremely early and dry, to late and wet. Intermittent rainfall, or snow cover is often experienced during swathing and combining operations. In some years Canadian rapeseed must overwinter in the fields to be harvested in the springtime. A grower's saying is that "the only dependable feature about Western Canadian harvest weather is that you can never depend on it".

These environmental variations experienced in rapeseed production in Western Canada can provide thus an extremely wide range of unpredictable processing conditions. To maintain the quality level of the products and maximize the output efficiency, these variations must be quickly recognized and alterations to techniques and procedures must be available and quickly adaptable.

An example of one of these variations is the result of pre-ripened seed due to the timing of a period of drought following the blooming period. Although the seed will be sound and of good colour, the seed size may be extremely small and low in moisture. Screen

sizes must be altered to prevent excessive losses in the cleaning operation and at the same time the percentage of small seeds of other plants and varieties must be closely checked. The extremely low moisture content will upset the handling and operations for the pre-press and solvent equipment. Continuous operation is only possible by alert personnel making machine adjustments to meet the needs to handle this seed of variable size and moisture content. Inattentive operators can cause loss of operating time with the resulting increase of unit output costs.

Another example of the effect on quality from environmental causes can be the delivery of rapeseed containing over 10.5% moisture following periods of rain or snow during the harvesting operations. The variation in this moisture can again cause downtime from delays with the pre-press and solvent equipment.

Another hazard from this moisture variation is the danger of including this high-moisture seed in large storage bins. Heating can rapidly occur and cause great losses in quality to the seed. No amount of alteration to equipment or operational procedures can produce a quality product, once the seed has become heated. Strict control measures, therefore, are essential before the seed is placed in storage.

(b) Soil fertility and available soil moisture - One of the earlier speakers discussed the effects of soil fertility on rapeseed quality. Besides the variation in chemical make-up, varying fertility levels can alter maturity dates, seed size, plant lodging, etc., and thus become an important environmental factor. One of the most difficult feats a processor has to perform, is to maintain a steady minimum protein level in the meal when the seed is obtained from fields of such varying fertility. Tests of our own would indicate that application of nitrogen fertilizer alone can increase the protein levels up to 3%. At the same time seed size and plant maturity will vary as well.

(c) Educational or Governmental programs can affect the quality of rapeseed. Experienced growers become adept at producing better yields, cleaner fields, and use safer storage. When acreage is being increased and new growers undertake rapeseed

production for the first time the quality of the seed usually is not as good as from a stable acreage from experienced producers. This depends, however, on how intensified the educational programs are which are offered by extension agencies, either government or company.

Government programs also create unusual conditions for better quality. The recent Canadian Government program for increasing summer-fallow will provide acres of cleaner land with more fertility for rapeseed production. This increased supply of higher quality rapeseed will make fewer problems for rapeseed processors because of better maturity, few impurities and more uniform seed.

(d) Storage availability, type and size of cleaning facilities and transportation equipment are other factors affecting quality of seed presented to the processor. Any of these can create variations in quality that must be discovered before processing by rapeseed crushers and refiners.

Will all of these quality factors affect all processors in the same way? Obviously some of the factors, such as high-moisture seed, would not likely ever be a problem to a crusher receiving seed off a ship from abroad, while local plants receiving direct farm delivery would have to face this factor in any country.

However, whether the crusher be located in Europe, Japan, or Canada, factors such as seed maturity, chemical composition, percentage of impurities, protein and oil content will create situations in which comparable solutions are required.

The ability to handle the variation in quality depends upon the volume handled by the processing plants and, in some cases, on the types of equipment in use at the individual plant. At the same time the importance of some of the quality factors will depend upon the uses for which the rapeseed products are being marketed. For instance, the desirable chemical composition of a rapeseed meal to be used as a poultry feed will be significantly different from the chemical composition required of a meal to be used as a fertilizer. The chemical make-up and specification for a liquid rapeseed oil shortening will differ significantly from the chemical composition required by a margarine oil from rapeseed oil. These requirements will also vary from country to country, depending on market requirement within those countries.

Markets and customer demands depend to a great extent on the acquired tastes developed within different nations over the years. Shifts in living standards and the effects of promotion and advertising may add new markets for an entirely different group of oils. If these changing demands and markets are to be satisfied, the processor must be able to adapt his procedures if possible to the quality of the rapeseed which is available.

Rapeseed probably has the widest range of variable chemical and physical qualities among all the world's major oilseeds. The discussions at this Conference will indicate that with new scientific techniques the range of rapeseed quality will be further expanded. It is not likely that all markets will be willing to accept a standardized product. What may seem to be a quality improvement to one country, could possibly be quite unacceptable to another. With this in mind the processor must be aware of and understand the tastes and preferences of his customers and will have to regulate the processing techniques and controls to provide these quality standards.

Thus, there could be no set rule that could apply to the standards for seed quality for all rapeseed crushing and refining processors. For example, the consumers in Pakistan may prefer a flavor residue within the oil, while the consumer in Sweden may demand a completely bland flavor in salad oils. Dietary habits, the standard of living and per capita oil consumption may minimize the effect of some quality variations of rapeseed oil in many countries. However, if the variability of the quality of rapeseed could be eliminated or minimized, it would benefit most processors, no matter where their operations are located or what products they may be producing.

Variations in quality are costly to processing plants through:

1. Loss of time - Plant shutdown due to flow interruption or breakdowns are costly for any plant, regardless of size.

2. Loss of volume - Plant shutdown and re-run time cause losses in production volume. In addition to the unit production costs being increased, these often cause delayed shipping schedules and lost sales.

3. Extra processing materials are required to be made available to compensate for or control quality variation.

4. Loss of markets to protect the seller against the risk of a lower quality product.

5. Increased costs to provide additional or extra equipment to properly protect against variation in quality.

6. High costs of training personnel to handle quality variations.

One obvious conclusion is, that rapeseed quality and the variation in rapeseed quality certainly has a definite effect on rapeseed processing procedures. New equipment design, added research, and modified techniques must be achieved to handle these quality changes and variations.