Kern Kraft KK-40 Camelina Crush Report

Date of oilseed processing: July 20th - 23rd 2010

Summary

The cleaned camelina from 2009 harvest appeared to have higher oil content than the camelina harvested in 2010. If we assume the 2010 camelina seed had 35% oil then the meal has about 10.4% residual oil content which is 70.3% oil recovery. If we keep the residual oil content of the meal constant for the 2010 seed then we can calculate that the 2010 camelina seed has about 24.2% oil. To verify these values the 2010 camelina seed can be sent to Kansas Grain Inspection or equivalent for oil content and the meal can be tested for fat content.

Summary Table:

	Seed (lbs)	Meal (lbs)	Oil (lbs)	Check (lbs)	Loss/Gain	Meal	Oil	Avg. Rate (tons/day)	Hours
2009	346.85	264	85.40	349.40	0.74%	75.56%	24.44%	0.46	8.39
2010	2040.31	1725.6	276.65	2002.27	-1.86%	86.18%	13.82%	0.47	64.77
Grand total	2387.16	1989.6	362.05	2351.67	-1.49%	84.60%	15.40%	0.47	73.16

Operation Notes:

I successfully started the Kern Kraft KK-40 crusher heated with a number 10 jet at 50 rpm to process camelina. When switching jets I found it critical to clear any meal residue before screwing the new jet on. This includes “film-ish” material that may be present on the back of the threaded end of a jet. If meal does not flow well (fast) out of the jet nozzle then there is a constriction that is backing up the system. If allowed to continue processing the meal will continue to be pressed out slowly but meal will be packing very tightly behind the jet, including potentially around the jet threads and you may see meal pushed through the oil holes.

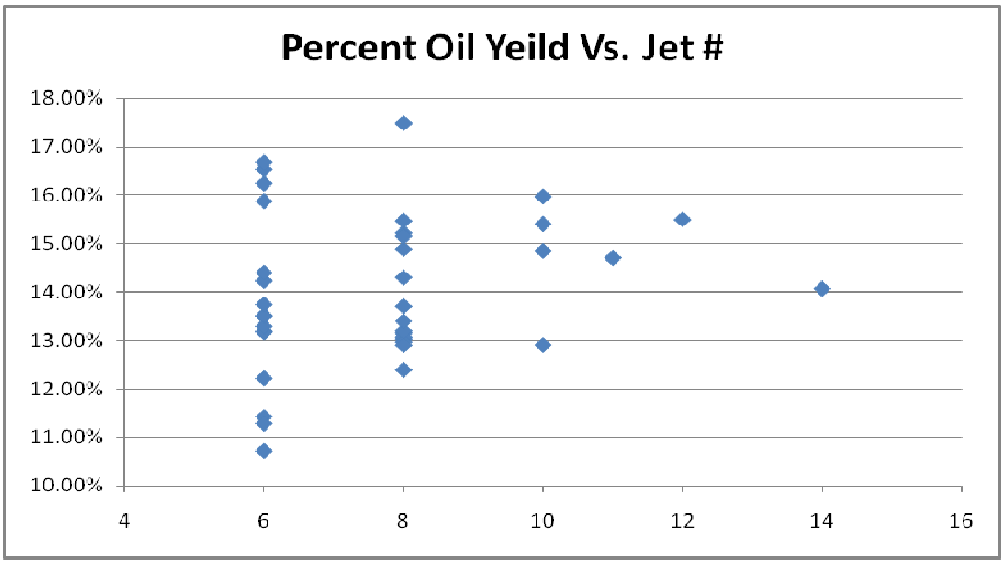
After changing jet sizes start the crusher at the same rpm that it was processing at. Evaluate the meal flow for 1 or 2 min. If one or both jets appear to be producing meal sluggishly then press stop. Remove the plugged jet. Press start with the jet removed just for a 2 second count or potentially longer until you observe no tightly compressed meal material flowing from the processer. Clean the jet interface with compressed air and potentially a rag. Clean the jet threads and replace jet. Re-start processor.

I recommend not removing a jet while the processor is running; I found this contributed to clogging potential. I was able to drop two jet numbers per jet switch. However, I found that the #10, #8 and #6 jets worked best. There seemed to be a tendency with the #7 and #6.5 jets to clog. One idea that I did not try was dipping the jets in the oil product, cleaning the jet threads with a paper towel and then installing. I think this would enhance the meal flow through the jet, potentially avoiding clogs.

With camelina (2% inert material) I was able to reach 0.6 to 0.7 tons per day (tpd) processing rate with a #10 jet at 50rpm and with a #6 jet at 115rpm. I did not evaluate the #10 jet at 115 rpm. Theoretically,

this would have produced less oil yield but it would have been nice to know if the Kern Kraft KK-40 can process camelina at 1tpd rate.

The graph below compares percent oil yield to jet number.



There did appear to be a correlation between lower rpm and higher oil yield as indicated in the Kern Kraft KK-40 manual.

The max speed the variable frequency drive indicated was 118rpm. I operated consistently at 115rpm without issue.

I cleaned the 2% foreign material from one batch of camelina seed and did not notice a change in the oil yield, as I anticipated, however the processing rate did appear to increase a little bit.

I utilized a 10rpm interval for increasing the rpm speed, followed by 10min of steady flow before increasing the rpm another interval.

The KK-40 does not have any moving metal parts that actually contact the metal casing. If the processor runs out of oilseed then the meal that is left within the screw will become very smooth and hard. A full cleaning is advised if this occurs.

The metal magnets are a chore to clean especially with the safety grate is in place. Cleaning the magnet with compressed air is fast but be sure to wear safety glasses and possibly gloves because the metal fragments fly in all directions.

Future operation of the KK-40 could be offered by University of Wyoming Extension. I recommend finding a small grain elevator to load the hopper and letting the meal drop to the ground to be picked up by a skid steer or bobcat with a front end bucket. An attempt should be made to identify the electric bill cost for crushing the 2,387lb of camelina seed. Alternatively, an electric meter could be installed to monitor this expense.

Lifting the oilseed 30lbs to 50lbs at a time to shoulder level or over head was labor intensive despite the long breaks between each lift.

Temperature vs. Jet # table:

		Average Temperature (deg F)	
Jet #	RPM	Motor Side	Control Side
14	35	130	137
12	40	142	137
11	60.5	138	148
10	50.7	130	142
10	60.5	130	150
8	60	130	150
8	90	140	150
6	70	156	160
6	115	150	160

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