Material Balance for Processing 100 t Fresh Fruit Bunches

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<table>
<tr><td colspan="2">Steam admitted : 25 t
Steam exhausted : 17 t
(approximate values)
Heat lost = 46 560 MJ</td><td>STERILIZATION
Pressure cooking at 3 bar about 90 min</td><td colspan="2">CONDENSATE OUT: 20 t
(Water with 1% residual oil)
TO EFFLUENT POND
Oil loss = 0.1% to FFB</td></tr>
<tr><td colspan="3">BUNCH STRIPPING-ROTARY DRUM: 17 rpm
Separates fruit from bunches</td><td colspan="2">EMPTY FRUIT BUNCH:
23 t
Oil loss: 0.52% to FB</td></tr>
<tr><td colspan="5">STERILISED FRUIT: 66 t</td></tr>
<tr><td colspan="5">DIGESTION
45 min: 90°C-95°C : steam heating. Stirrer 5 rpm, 5 sets of blades</td></tr>
<tr><td colspan="2">CRUDE OIL: 40 t
Oil 55%, water 35%, solids 10%</td><td>PRESSING
10 rpm Twin screw rotates opposite directions</td><td colspan="2">PRESS CAKE
26 t</td></tr>
<tr><td colspan="3">CRUDE OIL (46.5% to FFB) Water dilution (40%) 18.5% to FFB to get: Oil 39%, water: 54%, solids 7% in DCO</td><td colspan="2">NUT and FIBRE mixture
FIBRE: 13 t conveyed to the fibre cyclone and conveyed to boiler firing platform (oil loss = 0.55% FFB)</td></tr>
<tr><td colspan="3">VIBRATING SCREEN: (to remove fibrous tailings)</td><td colspan="2">NUT 13 t (oil loss: 0.05% to FFB)</td></tr>
<tr><td colspan="3">DILUTED CRUDE OIL TANK (65% to FFB)</td><td colspan="2">Nuts dried in steam/air heated silos 70°C for 14 hr</td></tr>
<tr><td colspan="3">Options: 1. De-sanding tanks 2. Primary clarifiers
3. Coalescence plate separator 4. horizontal clarifier
To remove as much oil and solids as possible to reduce residual oil in the underflow of the final clarifier</td><td colspan="2">NUT CRACKERS</td></tr>
<tr><td colspan="3">VERTICAL CONTINUOUS CLARIFIER</td><td colspan="2">Cracked mixture: kernel and shell</td></tr>
<tr><td colspan="2">SLUDGE 40 t</td><td>PALM OIL 20 t
(with dirt)</td><td rowspan="2">CRACKED MIXTURE SEPARATION
1. hydro-cyclones
2. Clay-bath separators
3.winnowing systems (dry)</td><td rowspan="2">Waste water about 5%</td></tr>
<tr><td colspan="2">SLUDGE CENTRIFUGE/ DECANTER</td><td>PURIFIER</td></tr>
<tr><td>Waste water clarification (Oil loss: 0.55%)</td><td>Recovered oil to clarifier</td><td>PURE PALM OIL
(OER = 20%)</td><td>WET KERNEL</td><td>SHELL: 7 t sent to silos</td></tr>
<tr><td colspan="2" rowspan="2">PALM OIL MIL MILL EFFLUENT
also from sterilisers 10%
nut station 5%
65%
(Total oil loss = 1.77% to FFB)</td><td>VACUUM DRYER</td><td colspan="2">KERNEL DRYING SILOS 14 hr at 70° C</td></tr>
<tr><td>PALM OIL STORAGE TANKS</td><td colspan="2">PALM KERNEL BULK STORAGE SILOS</td></tr>
</table>

Note: Data presented here may not necessarily be the same for all mills.