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## INTISARI

Susu tinggi protein adalah jenis susu yang memiliki kandungan protein yang tinggi dengan kandungan lemak dan laktosa yang rendah sehingga seringkali dimanfaatkan orang yang mengidap lactose intolerant, melakukan diet dan binaragawan yang ingin membentuk massa ototnya. Kementerian Perdagangan Republik Indonesia menyatakan bahwa per-2016, data impor susu tinggi protein mencapai 53.900 ton. Terdapat 11% penduduk Indonesia aktif fitness dan mengonsumsi susu bubuk tinggi protein. Maka dari itu, dengan mempertimbangkan kebutuhan, pabrik susu tinggi protein dapat menjadi peluang dalam memenuhi kebutuhan pasar yang ada.

Pabrik susu tinggi protein menggunakan bahan baku berupa susu segar dari sapi perah, *Skimmed Milk Powder*, *Whey Protein Concentrate*, dan bahan aditif seperti perisa dan maltodextrin untuk meningkatkan rasa dan tekstur. Proses pembuatan susu tinggi protein diawali dengan pasteurisasi pada *plate heat exchanger* (HE-101, HE-102, dan HE-103) untuk kemudian dicampur dengan SMP, WPC, dan bahan aditif oleh Mixer. Susu hasil *mixing* menuju ke *centrifugal separator* untuk mengurangi kadar lemak. Kemudian dilakukan ultrafiltrasi dan diafiltrasi untuk memekatkan protein dengan cara memisahkan *lactose* dan *ash*. Susu cair tinggi protein masuk ke *evaporator falling* untuk menguapkan kadar air hingga diperoleh TS sebesar 57%. Susu kemudian melewati *High Pressure Pump* sebagai *homogenizer* yang berguna untuk memecah dan menyeragamkan ukuran globula lemak sebelum masuk ke *Spray Dryer* (D-301) melalui *nozzle*. Padatan susu dengan berat jenisnya yang sesuai akan jatuh karena gaya gravitasi dan menuju silo penyimpanan padatan (S-301).

Pabrik susu tinggi protein dirancang berkapasitas 22.000 ton/tahun dengan beroperasi selama 330 hari/tahun dan 24 jam/hari. Pabrik akan didirikan di Kabupaten Pasuruan, Jawa Timur dengan 179 orang karyawan baik secara shift maupun non shift. Kebutuhan energi pabrik ini meliputi kebutuhan listrik sebanyak 984,74 HP dari PT Perusahaan Listrik Negara, dan kebutuhan air sebanyak 13,83 m<sup>3</sup>/jam dari berasal dari Sungai Air Welang

Pabrik ini memiliki nilai *fixed capital* sebesar \$26.812.438,30 dan *working capital* sebesar \$61.687.092,78. Pabrik susu tinggi protein memiliki sebesar \$18.191.472,87 sebelum pajak dan \$13.643.604,65 setelah pajak. Diperoleh parameter nilai ROI *after tax* 50,89%, POT *after tax* 1,67 tahun, BEP 48,98%, SDP 38,21%, dan DCFRR 21,15%. Pabrik susu tinggi protein tergolong dalam kategori risiko rendah (*low risk*) dan dapat dikaji lebih lanjut. Hal ini menunjukkan bahwa pabrik memiliki potensi untuk menghasilkan keuntungan yang memadai.

Kata Kunci: Susu Tinggi Protein, Susu Bubuk Tinggi Protein Susu Bubuk, *Drying* Susu, Ultrafiltrasi, Diafiltrasi

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## ABSTRACT

*High-protein milk is defined as a type of milk that has a higher protein content with low fat and lactose content, this milk is often used by people who are lactose intolerant, on a diet or a body builder who want to build their muscle mass. The Ministry of Trade of the Republic of Indonesia stated that as of 2016, import data for high-protein milk reached 53,900 tons. More than 11% of Indonesia's population is active in fitness and consumes high-protein milk powder. Therefore, considering the domestical needs, a high-protein milk powder plant can be a great opportunity to meet the existing market needs.*

*The high-protein milk plant uses raw materials such as fresh milk from dairy cows, Skimmed Milk Powder, Whey Protein Concentrate, and additives such as flavours and maltodextrin to improve taste and texture. The process of making high-protein milk begins with pasteurization on plate heat exchangers (HE-101, HE-102, and HE-103) and then mixed with SMP, WPC, and additives by a mixer. The mixing product goes to the centrifugal separator to reduce fat content. Then, ultrafiltration and diafiltration are carried out to concentrate protein by separating lactose and ash. High-protein milk enters the falling film evaporator to evaporate the water content until a total solid of 57% is obtained. The milk then passes through High-Pressure Pump as a homogenizer which is useful for breaking up and homogenizing the size of fat globules before entering the Spray Dryer (D-301) through the nozzle. Milk solids with the appropriate specific gravity will fall due to gravity and go to the solid's storage (S-301).*

*The high-protein milk plant is designed with a capacity of 22,000 tons/year and operates for 330 days/year and 24 hours/day. The plant will be established in Pasuruan Regency, East Java with 179 employees on both shift and non-shift basis. The energy requirements of this plant include electricity needs of 984,74 HP from PT Perusahaan Listrik Negara, and it water needs of 13.83 m<sup>3</sup> / hour from the Welang Water River.*

*This plant has a fixed capital value of \$26.812.438,30 and working capital of \$61.687.092,78. The high protein milk plant has \$18.191.472,87 before tax and \$13.643.604,65 after tax. ROI after tax 50,89%, POT after tax 1.67 years, BEP 4898%, SDP 38,21%, and DCFRR 21,15% are obtained. The high-protein dairy plant falls into the low-risk category and can be studied further. This indicates that the plant has the potential to generate adequate profits.*

*Keywords: High Protein Milk, High Protein Milk Powder, Milk Powder, Milk Drying, Ultrafiltration, Diafiltration*