

**PROTASTAR®**



innovation by nature

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**AVEBE FEED**

PROTASTAR®



PROTASTAR® is a pure potato protein with an extremely low content of glyco-alkaloids which significantly improves its taste. Tests have shown that PROTASTAR® can even be compared to such established quality products as skim milk powder, whey powder and spray - dried blood plasma. It has been proven that the growth and health of baby animals is equally good when they are fed PROTASTAR®.



## Pure growing power



**Glyco-alkaloids, growth inhibitors.** Glyco-alkaloids are substances naturally occurring in the potato to protect the plant against pests. The tomato and paprika we eat contain glyco-alkaloids as well. The glyco-alkaloid best known is solanine. Glyco-alkaloids cause the typical, somewhat bitter taste characteristic of potato protein. So, glyco-alkaloids might be called bitter components as well. An excess of bitter components is known to be one of the factors having a negative effect on feed intake. Lower feed intake reduces weight gain and often initiates health problems.

**Pure protein.** In the process of extracting the proteins from the potato sap part of the bitter components is left in the protein. AVEBE has succeeded in developing a complex refining process removing almost all bitter components. By extracting potassium at the same time we are able to reduce the ash content to less than 1.0%. The remaining ash consists almost entirely of organically - bound and thus easily available phosphorus. PROTASTAR® is a virtually pure protein without any bitter components.

**Comparison of the amino acid profile and protein content of PROTASTAR® to other top-quality protein sources**

	1	2	3	4
<b>Protein content (% in product)</b>	35	66	66	80
<b>Amino acid profile (g per 16 g N)</b>				
ile	5.2	4.4	4.8	5.9
leu	9.8	7.4	8.0	10.8
lys	8.2	7.2	6.3	8.0
met	2.6	2.9	1.4	2.4
cys	0.9	0.9	1.5	1.6
phen	4.8	3.9	5.3	6.9
tyr	5.0	2.9	3.6	5.8
thr	4.4	4.3	4.0	6.0
trp	1.3	1.1	1.3	1.3
val	6.4	5.5	5.0	7.1
arg	3.6	5.7	7.2	5.5
his	2.8	2.3	2.6	2.4
ala	3.4	6.0	4.3	5.1
asp	8.0	9.3	11.6	12.9
glu	22.0	13.0	18.4	12.2
gly	2.0	5.9	4.2	5.3
pro	10.0	4.1	5.5	5.2
ser	5.6	4.2	5.3	5.7

A = Skim Milk Powder  
 B = Fishmeal  
 C = Soy concentrate  
 D = PROTASTAR®

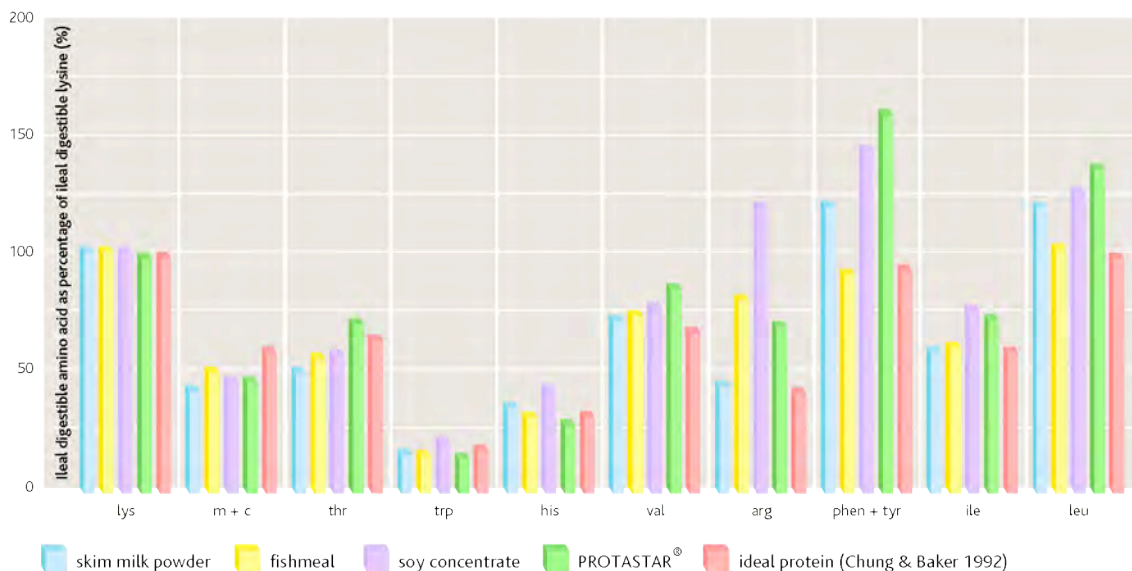
**A source of amino acids.** Potato protein has long been used as a component of weaner diets. It is known to have a high amino acid content, an excellent biological value and a good digestibility.

The special refining process which removes the substances that cause the bitterness does not affect its good amino acid composition. In fact the levels are actually improved because the purification makes the protein level go up.

PROTASTAR® contains a particularly high percentage of essential and semi - essential amino acids in such proportions as to very efficiently meeting the amino acid requirements of young piglets.

**Ideal protein profile.** In the diagram below the apparent ileal digestibility figures of amino acids are shown and the ideal protein profile of Chung & Baker. In each case the levels are expressed relative to the ileal digestible lysine content of the protein source.

**The similarities between PROTASTAR® and other sources of protein and the ideal protein profile of Chung & Baker**





## Test Results

**RAALTE Trial.** In this experiment, a weaner diet containing 5% PROTASTAR® was compared to a weaner diet containing 3% milk protein (skim milk powder and delactosed whey powder). After 14 days a gradual shift was made over to a baby pig feed. The test feed contained 5% PROTASTAR® throughout the entire 5 weeks' period. The control feed (baby pig feed) contained more soybean meal, fishmeal, and a small quantity of whey powder. In technical terms, the PROTASTAR® group performed at least as well as the control group. The feed conversion ratio, in fact, proved to be 5% better. It was remarkable that significantly less veterinary treatments against intestinal problems were required in the PROTASTAR® group.

### Average feed intake, gain and feed conversion ratio per treatment (RAALTE Trial)

	Control	5% PROTASTAR®
<b>Feed intake (g/day)</b>		
week 1 + 2	270	260
week 3 - end	800	770
week 1 - end	570	560

### Losses, veterinary treatments (RAALTE Trial)

	Control	PROTASTAR®
<b>Number of pigs involved</b>	234	233
<b>Number of pigs lost</b>	8	5
number per reason:		
- intestinal problems	5	3
- CNS problems	1	2
- miscellaneous	2	0
<b>Number of pigs treated</b>	91 <sup>a</sup>	61 <sup>b</sup>
number per reason:		
- intestinal problems	82 <sup>a</sup>	52 <sup>b</sup>
- leg problems	5	5
- respiratory problems	4	4

a, b: Averages on the same line with different letters differ significantly ( $p < 0.05$ ).

### Results (UPPSALA Trial)

	7.5% fishmeal	7.5% PROTASTAR®
<b>Feed intake (g/day)</b>		
Week 1	124 <sup>a</sup>	122 <sup>a</sup>
Week 2	304 <sup>a</sup>	366 <sup>b</sup>
Week 3	478 <sup>a</sup>	542 <sup>b</sup>
Week 4	586 <sup>a</sup>	678 <sup>b</sup>
Week 1-4	373 <sup>a</sup>	427 <sup>b</sup>
<b>Gain (g/day)</b>		
Week 1	48 <sup>a</sup>	19 <sup>a</sup>
Week 2	237 <sup>a</sup>	321 <sup>b</sup>
Week 3	355 <sup>a</sup>	419 <sup>b</sup>
Week 4	445 <sup>a</sup>	507 <sup>a</sup>
Week 1-4	272 <sup>a</sup>	316 <sup>b</sup>
<b>Feed conversion ratio</b>		
Week 1		
Week 2	1,28 <sup>a</sup>	1,13 <sup>b</sup>
Week 3	1,36 <sup>a</sup>	1,36 <sup>a</sup>
Week 4	1,32 <sup>a</sup>	1,33 <sup>a</sup>
Week 1-4	1,38 <sup>a</sup>	1,36 <sup>a</sup>

a, b: Averages on the same line with different letters differ significantly ( $p < 0.05$ )

**UPPSALA Trial.** In a trial with piglets weaned at the age of approx. four weeks the Agricultural University of Sweden compared a diet containing 7.5 % PROTASTAR® with a diet containing a high quality fishmeal (72 % crude protein) as the main protein source.

The results clearly show an improved performance with PROTASTAR® proving that PROTASTAR® can replace high quality fishmeal without any problem.

## Test Results

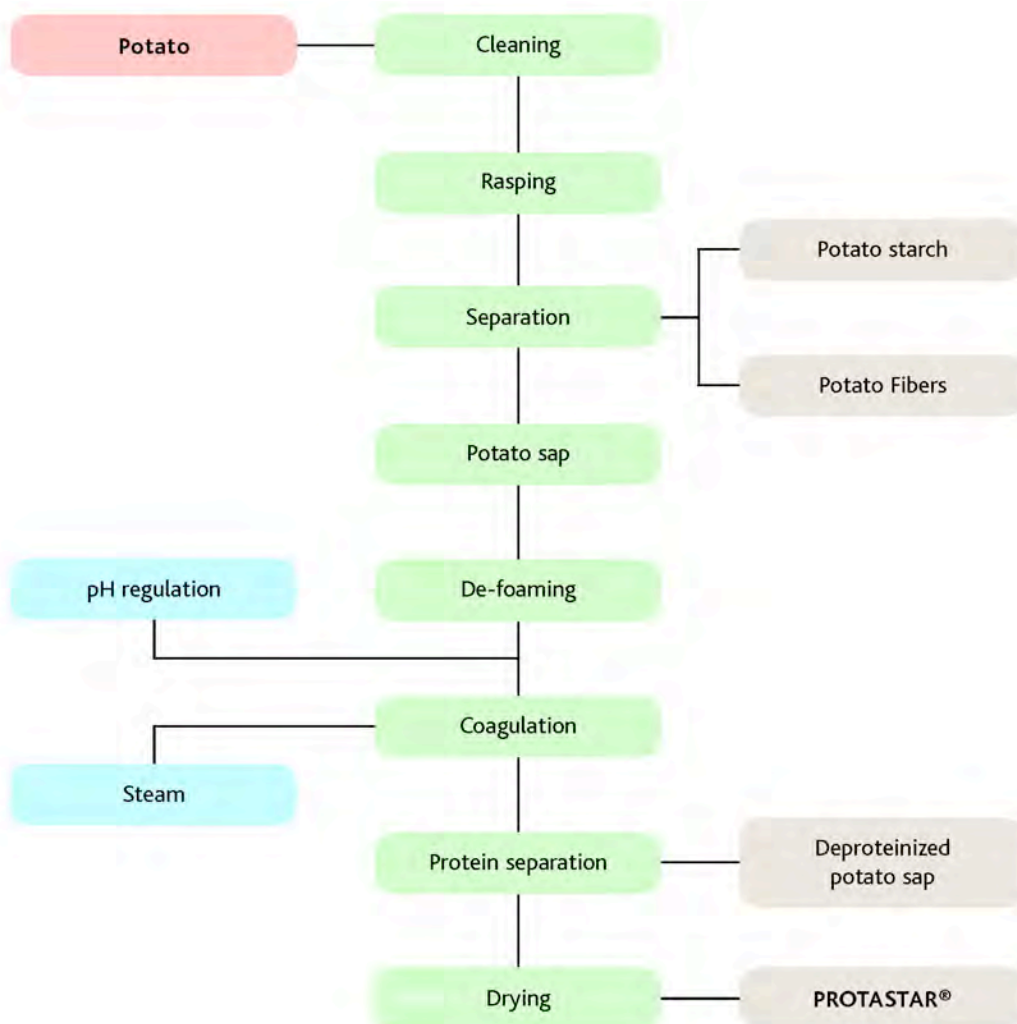
**KANSAS STATE UNIVERSITY Trial.** In this test with young pigs (weaned at  $\pm 5.9$  kg), for the first 14 days after weaning, PROTASTAR® gradually replaced blood plasma (from 0 to 8% and 7 to 0% resp.) Particularly the groups in which PROTASTAR® was used in addition to blood plasma proved to perform better. The addition of PROTASTAR® improved the feed conversion ratio of all groups.

### Average gain, feed intake and feed conversion ratio per treatment

	Blood plasma / PROTASTAR® (%/%)				
	7/0	5.25/2	3.5/4	1.75/6	0/8
<b>Feed intake (g/day)</b>					
days 0 - 7	263 <sup>a</sup>	309 <sup>b</sup>	277 <sup>a</sup>	300 <sup>b</sup>	254 <sup>a</sup>
days 0 - 14	350 <sup>ab</sup>	386 <sup>c</sup>	350 <sup>ab</sup>	377 <sup>bc</sup>	340 <sup>a</sup>
days 14 - 358	12	794	794	831	835
days 0 - 35	626	631	617	649	640
<b>Gain (g/dag)</b>					
days 0 - 7	245 <sup>a</sup>	309 <sup>c</sup>	295 <sup>bc</sup>	309 <sup>c</sup>	263 <sup>ab</sup>
days 0 - 14	291 <sup>a</sup>	350 <sup>b</sup>	322 <sup>ab</sup>	336 <sup>b</sup>	331 <sup>b</sup>
days 14 - 35	604	590	599	613	613
days 0 - 35	481	490	490	504	499
<b>Feed conversion ratio</b>					
days 0 - 7	1.10	1.00	0.94	0.98	0.99
days 0 - 14	1.20 <sup>c</sup>	1.12 <sup>bc</sup>	1.08 <sup>ab</sup>	1.12 <sup>bc</sup>	1.03 <sup>a</sup>
days 14 - 35	1.33	1.35	1.31	1.33	1.35
days 0 - 35	1.30	1.28	1.26	1.28	1.26

a, b, c: Averages on the same line with different letters differ significantly ( $p < 0.05$ ).

## Production Process





## Feed for Food

**Quality Assurance.** AVEBE FEED takes its position in the feed chain very seriously and carefully secures the quality, reliability and safety of its products. Our products are pure and safe, 100% vegetable and natural. Produced in a chain that we control completely. After all, not only the production should conform to the strictest requirements, but the transport companies we contract should do as well. Our products enter the food chain via our customers in the animal feed industry. This is the basis of human nutrition: feed for food.

AVEBE FEED is certified by Lloyds in accordance with the NEN-ISO 9001:2000 standard and complies with the GMP+ legislation.

**Application of PROTASTAR®.** Due to its ideal amino acid pattern and outstanding digestibility, combined with the absence of anti - nutritional components and its low ash content, PROTASTAR® is particularly suited to be included in pre-starters or weaner diets (phase 1). An inclusion rate of 8% is possible. Additions of 4 to 6% appear to be more in line with every day practice and yield excellent results.

**Support of PROTASTAR®.** PROTASTAR® is a product with a high added value. As a result of our extensive testing of PROTASTAR®, we are optimally equipped to answer any specific questions you may have. We would also be pleased to advise on the use of PROTASTAR® in your own formulas.

### Product

Appearance	yellow-white free-flowing powder
Moisture content	9-11 %
Crude protein(N*6.25)	86-92 % (in the dm)
Total glyco-alkaloid content	< 110 µg/g (in the dm)
E. coli	CFU/g p.a.s. absent
Salmonella	CFU/25 g p.a.s absent

### Types of packaging

PROTASTAR® is available in	bulk 1000 kg big bags 25 kg bags
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*PROTASTAR® is available year-round.*



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