DAESANG

Protam

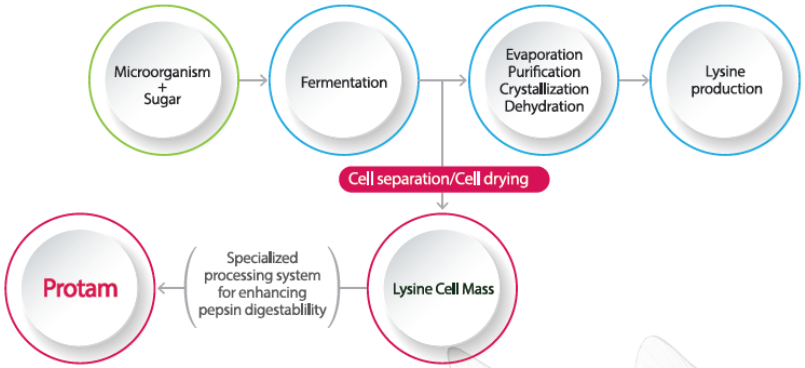
Bacterial cell mass for protein source

DAESANG Corp. Ingredient Business Unit

Bio Solution 2 Team (Feed Business)

❖ Introduction of Protam

What is Protam?



Bacterial cell mass from lysine fermentation has the great potential to be used as an alternative high protein source one of the most expensive ingredients in poultry feed.
SEWON Protam is mainly composed of dried bacterial cell mass that is produced during the manufacturing process of lysine.
In addition, Protam is that improves digestion rate through hydrolysis process to increase usability of Lysine cell mass.

Applications & Functions

Poultry feed

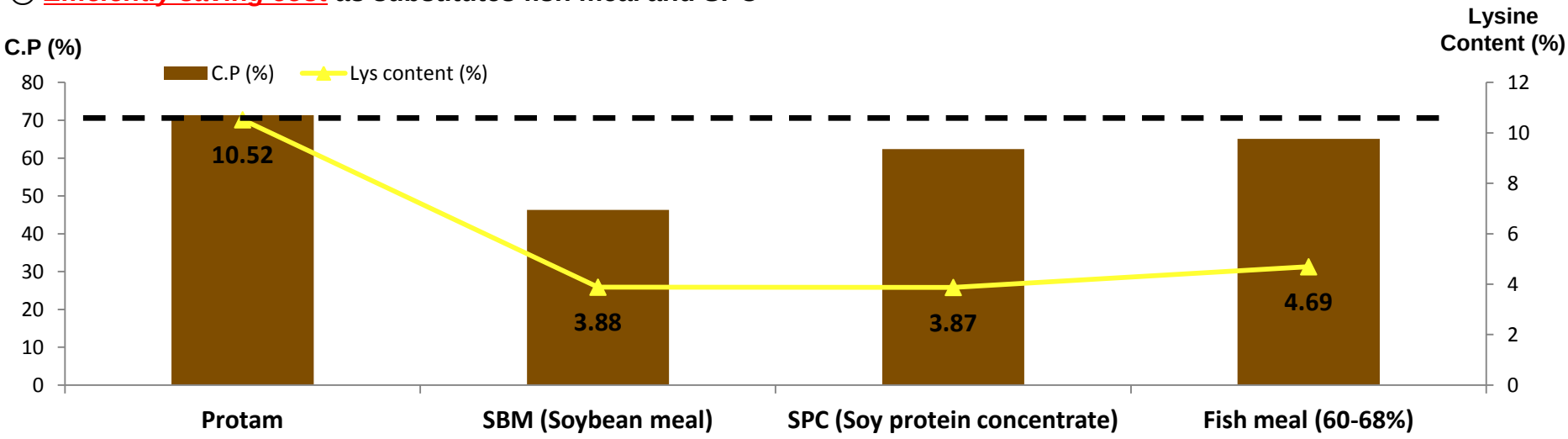
- **Alternative protein sources**: Partial replacement of fish meal, Soybean meal, Soy protein concentrate, other protein source in poultry feed
- **High level protein and excellent amino acid composition**
- **Applicable species**: Broiler chicken, Layer chicken, Duck, Turkey, Geese, etc

Product profile

Source	*Corynebacterium glutamicum*
Country of origin	Republic of Korea
Crude protein	Min. 65.0 %
Moisture	Max. 13.0 %
Appearance	Granule type
Storage	Packaging in a cool, dry and dark area at room temperature
Shelf life	2 year from date of manufacture
Packaging	1 mt net in a bulk bag, 25kg paper bag

❖ Protam vs. Fish meal, SPC

- **Protam's Advantages**
  - ① ***High level protein & excellent amino acid composition***
  - ② ***High Lysine content*** **compared to fish meal, soybean meal, and SPC ingredient, Low ash content**
  - ③ ***Efficiently saving cost*** **as substitutes fish meal and SPC**



Content	Protam	SBM (Soybean meal)	SPC (Soy protein concentrate)	Fish meal (60-68% protein as fed)
Application purpose (Poultry feed- protein source)	**Replacement of Fish meal, Soybean meal, SPC, Other protein sources**	**Broiler chicken, Layer chicken, Duck, Turkey, Geese feed**		
C.P (%)	**71.36**	46.3	62.4	65.1
Digestibility coefficient of C.P (%), (Poultry)	**79.7**	85.0	99.0	87.0
Digestible C.P (%)	**57.1**	39.4	61.8	56.6
Lys contents (%)	**10.52**	3.88	3.87	4.69
Ash (%)	**3.03**	7.1	6.9	17.0

❖ Component analysis profiles

• General analysis

Item of analysis	Unit	Protam	SBM (Soybean meal)	SPC (Soy protein concentrate)	Fish meal (60-68% protein as fed)
Moisture	%	6.07	12.0	7.3	7.8
Dry matter	%	93.93	88.0	92.7	92.2
Crude protein	%	**71.36**	46.3	62.4	65.09
Crude fat (Ether extract)	%	2.25	1.8	0.4	9.13
Crude Ash	%	3.03	7.1	6.9	17.0

• Amino acid profiles

Amino acids	Unit (DM basis)	Protam	SBM (Soybean meal)	SPC (Soy protein concentrate)	Fish meal (60-68% protein as fed)
Arginine	%	3.14	4.56	4.59	3.88
Histidine	%	1.34	1.69	1.67	1.50
Lysine	%	**10.52**	3.88	3.87	4.69
Methionine	%	1.00	0.88	0.85	1.69
Threonine	%	2.69	2.38	2.47	2.56
Tryptophan	%	0.52	0.88	0.81	0.63
Valine	%	2.29	3.00	3.01	3.06

❖ Application_ Broiler chicken

• Effect of dietary *Corynebacterium* derived single cell protein on growth performance

➢ **Growth performance (1-35 day)**: SCP 1% additive has the highest growth efficiency, No problem with growth up to 3% addition

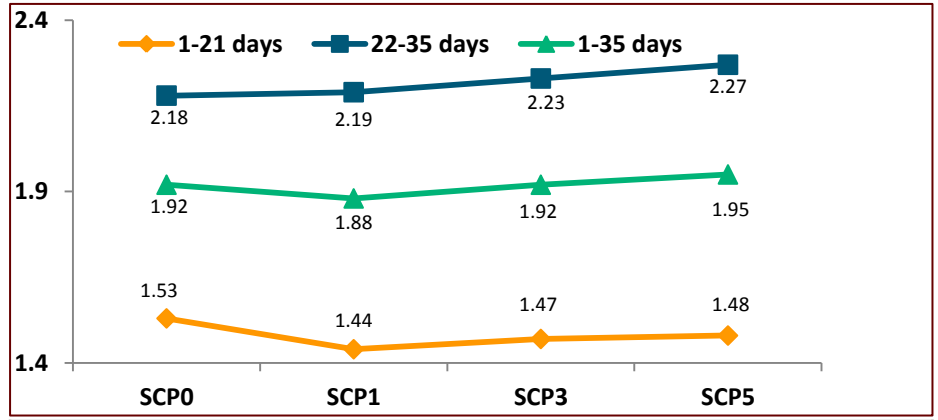
Analyzed chemical composition of single cell protein

Chemical composition	Single cell protein
Dry matter (DM)	96.02
Crude protein	60.94
Crude fat	7.94
Crude ash	7.15
Crude fiber	1.40
Starch	0.18
TMEn, MJ · kg^{-1} DM basis	13.54

Formula of the experimental diets, g · kg^{-1} of diet, as fed

Indices	Starter (1-21 day)				Finisher (22-35 day)			
	SCP0	SCP1	SCP3	SCP5	SCP0	SCP1	SCP3	SCP5
yellow maize	578.4	584.1	595.3	606.7	641.9	647.7	658.8	660.8
soybean meal	**303.2**	**290.4**	**264.9**	**239.3**	**254.2**	**241.4**	**215.7**	**205.0**
maize gluten meal	50.0	50.0	50.5	50.0	40.0	40.0	40.0	30.4
tallow	**29.0**	**25.9**	**19.8**	**13.6**	**25.8**	**22.7**	**16.6**	**15.0**
single cell protein	**0.0**	**10.0**	**30.0**	**50.0**	**0.0**	**10.0**	**30.0**	**50.0**
dicalcium phosphate	20.2	20.0	19.5	19.1	14.9	14.7	14.3	13.8
L-lysine.HCl (78%)	0.4	0.6	0.9	1.3	0.8	1.0	1.4	1.5
DL-methionine (98%)	1.2	1.1	1.0	0.9	0.9	0.8	0.8	0.8
limestone	11.6	11.8	12.3	12.7	15.2	15.4	15.9	16.2
Choline-Cl (50%)	0.5	0.6	0.8	0.9	0.8	0.8	1.0	1.0
salt	3.0	3.0	3.0	3.0	3.0	3.0	3.0	3.0
vitamin-mineral mixture	2.5	2.5	2.5	2.5	2.5	2.5	2.5	2.5

Growth performance (Feed conversion ratio, g.g^{-1})



Feed conversion ratio (g.g^{-1})

Stage	SCP0	SCP1	SCP3	SCP5
1-21 days	1.53^{a}	1.44^{b}	1.47^{ab}	1.48^{ab}
22-35 days	2.18	2.19	2.23	2.27
1-35 days	1.92	1.88	1.92	1.95

Reference : B.-K. An et al., *Journal of Animal and Feed Sciences, 27, 2018, 140–147.*

• Growth performance (starter stage, 1-21 day): SCP 1% additive diets has the highest growth efficiency, No problem with growth up to 5% addition.

• Growth performance (1-35 day): The SCP 1% added trial has the best growth efficiency, but can be applied up to 3% added.

❖ Application_ Broiler chicken

• Dietary effect of single cell protein on blood parameters

➢ **Supplementation of SCP did not affect blood parameters** (Total cholesterol, albumin, BUN, GOT, GPT)

Blood parameter

Indices[1]	Treatment				Biochemical value	Reference
	SCP0	SCP1	SCP3	SCP5		
Blood profile						
GOT, IU. l^{-1}	99.78	99.16	97.83	96.33	95.6 - 100.5	Adil et al. (2010)
GPT, U. l^{-1}	9.05	10.73	9.40	9.10		
T-Cho, mg. dl^{-1}	134.70	129.30	114.20	127.70	115.2 - 163.6	Bowes et al. (1989)
Albumin, g. dl^{-1}	1.21	1.08	1.23	1.25	1.18 - 1.37	Bowes et al. (1989)
BUN, mg. dl^{-1}	3.11	3.01	2.94	2.96	Mean value: 3.11	Scanes, 2015

Indices[1]: GOT – glutamic-oxaloacetic transaminase, GPT – glutamic-pyruvic transaminase, T-Cho – total cholesterol, BUN – blood urea nitrogen.

Reference : B.-K. An et al., *Journal of Animal and Feed Sciences, 27, 2018, 140–147.*

- All serum parameters were within the reference ranges for chickens.
- Serum GOT and GPT are considered as the indicators of normal liver functions and are often used to determine a safe inclusion level for non-conventional feedstuffs.

❖ User's manual

- **Product**: Protam
- **Product type**: *Corynebacterium* sp. based granule type
- **Usage**: Substitution of fish meal, soybean meal, SPC, and other protein sources in poultry feed
- **Applicable species**: Broiler chicken, Layer chicken, Duck, Turkey, Geese, etc
- **Recommended amount of poultry feed**

Broilers

Stage	CP content (Feed)	Recommended dosage
0 to 3 weeks	23%	0.5 ~ 3.0 %
3 to 6 weeks	20 %	
0 to 3 weeks	18%	

Layers

Stage	CP content (Feed)	Recommended dosage
0 to 6 weeks	18.00	0.5 ~ 2.0 %
6 to 12 weeks	16.00	
12 to 18 weeks	15.00	
18 weeks to first egg	17.00	

- **Advantage**

1. ***High level protein & excellent amino acid composition***
2. ***High Lysine content***
3. ***Cost saving effect***
4. ***Continuous availability***, ***Constant product specification***
5. ***Chicken broiler & layer***: Applicable up to 3% in poultry feed

- **Nutrition profile[1)]**

Nutrients	Contents
Crude protein (%)	71.36
Crude Fat (%)	2.25
Crude Ash (%)	3.03
Crude Fiber (%)	0.04
Moisture (%)	6.07
Non-protein nitrogen (%)	0.83
L-Lysine	10.52

Nutrition profile[1)]: Protam analysis result
(Korea Feed Ingredients Association Feed Research Institute)