Egg Powder

Improving egg consumption in low- and middle-income countries

What is egg powder?

Often referred to as 'powdered-egg', 'dry egg', 'dried egg powder', or even the 'Ersatz egg' at a certain time in history, egg powder is defined as eggs that have been dehydrated and turned into an easy-to-store powder.
Whole egg powder is a pasteurized spray-dried product from fresh hen eggs and its production time is the same as for powdered milk. Whole egg powder is consumed in hotels, hospitals, restaurants, and military establishment, for example; as well as used in bakeries and in cake mix manufacturing.

Eggciting Innovations

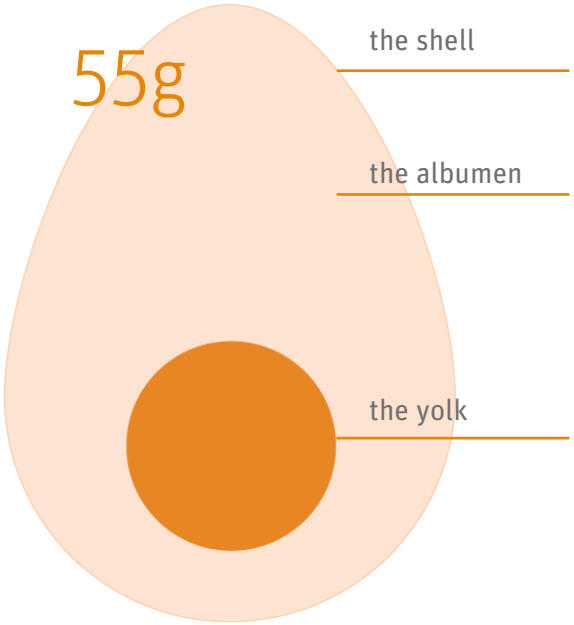
The use of egg powder, the equivalent of one egg a day, as a complementary food supplement would allow children to meet or exceed the WHO/FAO dietary requirements for all essential amino acids and makes significant contribution to the intake of vitamins, minerals and essential lipids. Sight and Life's Eggciting Innovation project is exploring innovations to improve affordability and availability of egg powder in low- and middle-income countries. Consumer research/acceptability and market feasibility studies will be conducted.

Eggs, in full or in part, are used to prepare powder in different industries[i] such as:

Whole egg powder (WEP)
is used in classical food applications where rising qualities are not essential, such as crackers, cookies and pasta.

Egg yolk powder (EYP)
is used as a substitute for fresh egg yolk to obtain color, texture, and emulsion capacity. Egg yolk powder is most frequently used in mayonnaise, dressings, sauces and croissants.

Egg albumen powders (EAP)
is used in a range of items from fish, meat, and potato preparations to bakery and pastry products.



An egg consists of 3 main parts: the shell (10%), the albumen or egg white (60%) and the yolk (30%). An average egg weighs about 55-60 grams.

What is the history of egg powder?

Use of powdered eggs dates back to the Middle Ages when Chinese used to airdry eggs that that had been whipped and left in the sun to dry and then ground. Powdered eggs also appear as a staple of camp cooking as early as 1912[ii]. Their ease of storage and nutritional quality were also practical advantages in supplying military troops[iii], and were used in the United Kingdom during World War II for rationing and were known as "Ersatz eggs" during that time.

The modern method of manufacturing powdered eggs was developed in the 1930s by Albert Grant and Co. of the Mile End Road, London. This cake manufacturer was importing liquid eggs from China and one of his staff realized that they were 75% water. An experimental freeze-drying plant was built and tried. The British Government lifted the patent during the war and many other suppliers came into the market notably in the United States.

What are the advantages of using the egg powder?

Dried whole egg powder has a few functional advantages compared to the regular shell eggs, including:

1. Extended shelf life: Powdered eggs benefit from an extended shelf-life of 18 months, and if properly sealed 5 to 10 years (much longer than regular eggs) if stored in a cool and dry place. Egg powder does not need to be refrigerated.
2. Ease of storage: Dried eggs require much less storage space. This means that substantial supplies of eggs can be kept on hand in a relatively small space. Egg powder is also comparatively easier to handle and transport than liquid eggs and there is no question of any breakage during the transit.[iv]
3. Reduced risk of food borne illness: The primary risk associated with eggs is food-borne illness caused by Salmonella bacteria. However, powdered eggs are pasteurized which destroys Salmonella and any other bacteria.[v]
4. Ease of use: As a complementary food supplement for infants and young children, the dry powder can simply be added and mixed with the porridge. Powdered eggs can be used without rehydration when baking and can be rehydrated to make dishes such as scrambled eggs and omelettes.[vi]
5. Economic Advantage: Compared to whole eggs, egg powder is more affordable. The retail price of 100 eggs is US $15 while the comparable value for egg powder (1.3 kg) is US $10. The calculations are provided in Table 1 of the annex.

   Additionally, the largest and most affordable producers of egg powders are found in the countries/regions with intensive production systems including Brazil, Europe and South India, which have low egg production costs.

How does one make egg powder?

The egg powder manufacturing process starts with fresh eggs that are put through different advanced machines. After removal of egg shells, the mixture is filtered and stored in storage tanks at about 4 degrees.[i] The eggs, egg whites or egg yolks are pasteurized and spray-dried in a thin layer. This is done in a room with high temperature to enable water to evaporate out of the eggs. The material which comes out of the high-pressure spray dryer is in a dried and powdered form which is then packed for transport.[i]

The below figure gives an overview of the egg powder processing process:

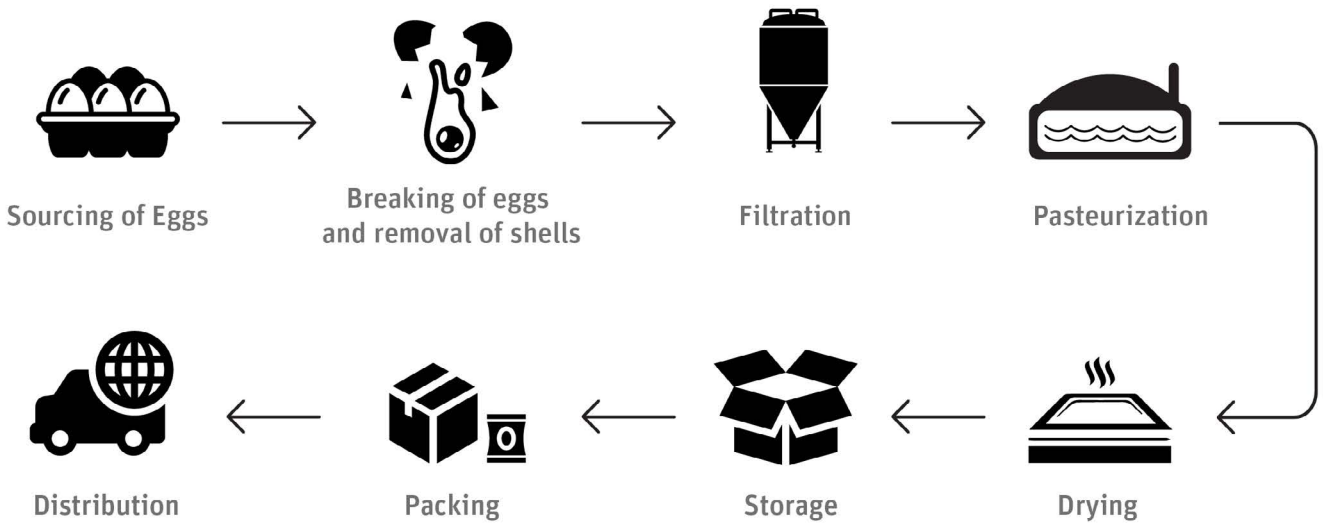


FIGURE 1: Manufacturing Process

Annex

TABLE 1: Price comparison of whole egg and egg powder (per 100 eggs)

100 eggs are equivalent to 1.3 kg of egg powder.
We therefore have to compare the price of 100 eggs and 1.3 kgs of egg powder

1.3 kgs of egg powder	100 eggs
Whole egg powder price (wholesale price): US$ 7 per kilogram	
Whole egg powder retail price: US$ 8.05 per kg (15% margin)	Whole egg retail price: USD 0.15/egg
Retail price of 1.3 kg of whole egg powder: US$ 8.05*1.3 kg = US $10.5	Retail price of 100 eggs: 100*0.15 =US$ 15

FIGURE 2: Nutritional label for whole egg powder

Ingredients: Homogenised, pasteurised and spray dried fresh hen eggs.
No Additives.

1 part whole egg powder to 3 parts of water.

Instructions for Use:
Reconstitution ratio

- Mix 1 part whole egg powder to 3 parts of water.
- Whisk until thoroughly mixed.
- Cook as you would normally use a beaten egg to make scrambled eggs, omelettes, baking recipes or add it to main meals (porridge).
- Refrigerate any remaining liquid egg.
- Seal properly the remaining powder and store in a cool and dry place.

No refrigeration needed.

Storage: Keep dry
At room temperature (15-25 ºC)
Shelf life: Minimum 2 years,
At 5-10°C even longer.

Batch: 24920

Best before: 04.05.2020

Sample. Not for sale

Typical nutrient information single serving size: 15g	per single serving	% RDA
Energy (kcal)	88.80	
Protein (g)	7.21	65
Sugars, total (g)	0.08	
Calcium, Ca (mg)	36.60	14
Iron, Fe (mg)	1.08	10
Phosphorus, P (mg)	94.35	34
Potassium, K (mg)	81.00	11
Copper, Cu (mg)	0.03	15
Selenium, Se (mg)	12.50	62
Zinc, Zn (mg)	0.47	16
Thiamin (mg)	0.03	10
Riboflavin (mg)	0.30	75
Vitamin B_6 (mg)	0.07	23
Folate, DFE (µg)	17.85	22
Vitamin B_{12} (µg)	0.44	88
Vitamin A, RAE (µg)	45.15	9
Vitamin E (mg)	0.58	11
Vitamin D (µg)	1.00	10
Pantothenic Acid, B_5 (mg)	0.64	36
Choline (mg)	122.00	81
Vitamin K (phylloquinone) (µg)	0.18	7
Lipids (g)	6.06	20
Linoleic acid, N_6 (g)	0.64	14
α-Linolenic acid, N_3 (g)	0.02	4
DHA (g)	0.03	

**RDA for infants aged 7–12 months*

[i] Government of Gujarat. (2017). Establishment of Egg Powder Unit. Gujarat: Government of Gujarat

[ii] Dutch Egg Powder Solutions (2018). All egg powdered products. Internet: https://www.deps.eu/products/ (accessed 6 September 2018).

[iii] Bhandari, Bhesh R., et al., eds. Handbook of food powders: processes and properties. Elsevier, 2013.

[iv] Jodi W. (2009). All About Powdered Eggs. Internet: http://foodstoragemadeeasy.net/2009/08/06/beyond-the-babysteps-lets-talk-about-powdered-eggs/ (accessed 6 September 2018).

[v] American Egg Board. (2018). Eggs & Food Safety. Internet: https://www.incredibleegg.org/egg-nutrition/egg-safety/ (accessed 6 September 2018).

[vi] Miranda, Jose M., et al. "Egg and egg-derived foods: effects on human health and use as functional foods." Nutrients 7.1 (2015): 706-729.