COUSCOUS : A VERSATILE PROCESS AND PRODUCT

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According to codex alimentarius (Codex Stan 202-1995):
Couscous is a product prepared from durum wheat semolina (Triticum durum) the elements of which are bound by adding potable water and which has undergone physical treatment such as cooking and drying. Couscous is prepared from a mixture of coarse and fine semolina. It can be prepared from “coarse medium” semolina.

Extension
Products intended for the same use but prepared from cereals other than durum wheat may be designated as “couscous” on condition that this appellation be immediately followed by a specification of the cereals used.
From tradition to modernity

17th century
Spread in Europe

18th century
Brazilian version with corn flour introduced in America

Born in North Africa 3000 years ago
Hand made couscous

60’s: industrialization of couscous production by French producers
1969: 1st Turn key plant by BASSANO/AFREM

Today, couscous is not only an ethnic food but also a versatile & convenient dish spreading in world cuisine.
2nd favourite dish in France.

In 2010: 1st couscous festival in Pasadena California & 13rd couscous fest in Sicily
A starchy dry product versatile and quick to prepare:

- A third transformation product with various sizes of grains
- Long and easy conservation
- Specific dimension for rehydration which is exceptional: the semolina grain
  - It is the rehydration which determines the preparation time of the dry starchy products
    - For pasta, reduction of the thickness
    - For rice, creation of fracture
    - For « Ebly » tender wheat, mastered expansion

Couscous is the quicker to prepare:

- 5 min rehydration in boiled water
- 1 H rehydration in cold water or sauce (salad like taboulé)
Couscous & rolled products
Process diagram & industrial production
Couscous & rolled products
The industrial process

Uptream

Raw material storage

Production unit
Mixing + Rolling

Cooker
Steam cooking

Drying line
Rotante 1 + Stabilizing cooler

Sifting Roller mill

Finished product Storage + Packaging

Downstream
Couscous & rolled products
Industrial process – Step 1

Production unit – 2 functions:
Mixing/hydration and shaping/sorting

Mixing - Hydration
The hydration of the semolina/flour in the mixer enables:

- Further agglomeration of semolina/flour particles to be able to form the couscous grains
- Sufficient hydration of each starch grain for a high gelanization after cooking

Agglomeration, rolling, compacting and sorting

Afrem/Clextral chose to develop from the beginning the « Roller », a special equipment for reproducing the hand made process of rolling the grain to agglomerate it.

Other manufacturers use a planchister but it imposes too weak water levels
Couscous & rolled products
Industrial process – Step 1

The Roller in the production unit – a Key element
Cooking: Why is couscous cooked?

- Make the couscous digestible without any supplementary cooking
- Texture in the mouth (the swelling index is important)
- Solidify the product by « sticking » the particles
- Be able to separate the grains after cooking with less fines generation

Traditional way of cooking couscous in a « couscoussier »

Industrial equipment: steam cooker
Couscous & rolled products
Industrial process – Step 2

Afrem/Clextral cooker: a continuous « couscoussier »

Couscous

Vegetables
+ Meat
+ sauce

Low pressure moist steam

Injection ramp

Voluminous lower frame

Voluminous lower frame
Drying & cooling

Very high temperature drying in Rotary dryer

- **The VHT process is adapted to improve quality:**
  - High yellow index
  - Drying homogeneity

- **Couscous is very easy and quick to dry**
EVOLUM® dryer benefits:

High energy efficiency of 860 kCal/KgH2O

⇒ 90% drying efficiency

- Optimal product surface exposure to heated airflow
- Multiple drying zones
- Uniform, thinner product depth
- Efficient use of airflow & air exhaust
- Reduced air volume in drying chamber
- Consistent Time & Temperature exposure

Couscous & rolled products
Industrial process – Step 3
• A large range of outputs: from 500 kg/h to 3600 kg/h
• Installed electrical power adapted to the line output
• Product follow up along the process with plc control
  – Steam injection in the cooker can be piloted (no under or over cooking)
  – Drying zones are adapted and piloted (no under or over drying)
• Mastering of recyclings
  – Adapted to the type of product to be recycled
A large variety of traditional rolled couscous can be processed mainly from gluten free raw materials.

Wheat couscous is well industrialized as well as other type of couscous from different raw materials.

The same process can be used.

The industrial equipment has a high potential of evolution.
Couscous & rolled products
Different raw materials

Couscous:
very high porosity product

Other rolled products:
Less porous than wheat couscous
More porous than pasta

Durum wheat
Soft wheat
Rice
Corn
Millet
Sorghum
Manioc
Igname

Semolina
Semouline
Flour

Couscous production technologies
Non wheat raw materials : the Gluten-free claim

Gluten free diets are more and more requested. The gluten free market is growing in industrialized countries.

% evolution of celiac intolerance 1980 – 2003
Not only couscous... but also more cuscuz