

Claims

1. A method of producing a fibrous protein
5 product (12) from a wet textured product material (11),
the wet textured product material (11) comprises
- at least 10wt% of proteins possessing a fibrous struc-
ture
- at least 35wt% water,
10 the fibrous protein product (12) being selected from the
group consisting of
- a deformed product (12a),
- an initial pulled product (12b),
- a block product (12c), and
15 - a final pulled product (12d)
the method comprising the step of
a) elastic-plastically deforming the wet textured product
material (11), thereby changing the fibrous structure
to obtain the deformed product (12a).
20
2. The method according to any one of the
preceding claims, wherein the wet textured product mate-
rial (11) is textured by means of high moisture extrusion
cooking, printing, shear cell processing, kneading and/or
25 fiber spinning.
3. The method according to any one of the
preceding claims, wherein the wet textured product mate-
rial (11) is elastic-plastically deformed by means of at
30 least one pair of rolls, wherein there is a roller gap
size $rg1$ between the two rolls with $rg1 \leq 0.8$ of the
height h of the wet textured product material, in partic-
ular with a roller gap size of $rg1 \leq 0.4$ of height h , in
particular with a roller gap size $rg1$ of $0.1 \text{ mm} \leq rg1 \leq$
35 3.6 mm .

4. The method according to any one of the preceding claims, wherein elastic-plastically deforming the wet textured product material results in the deformed product with a thickness t_{dp} smaller than the height h of the wet textured product material and a thickness t_{dp} larger than the roller gap size $rg1$ or than the thickness at maximum compression h_{comp} , in particular the thickness t_{dp} is ≥ 2.5 times the roller gap size $rg1$ or the thickness at maximum compression h_{comp} , in very particular the thickness t_{dp} is ≥ 2.5 and ≤ 7 times the roller gap size $rg1$ or the thickness at maximum compression h_{comp} .

5. The method according to any one of the preceding claims, wherein elastic-plastically deforming the wet textured product material (11) by means of at least one pair of rolls results in a thickness t_{dp} of the deformed fibrous protein product of below the height h of the wet textured product material but above the roller gap size $rg1$, in particular wherein $0.7\text{mm} \leq t_{dp} \leq 9\text{mm}$.

6. The method according to anyone of the preceding claims, comprising the subsequent step of b) pulling or cutting apart the deformed product (12a) to obtain the initial pulled product (12b).

7. The method according to claim 6, comprising the subsequent step of c) forming the initial pulled product (12b) to a block product (12c), in particular forming a mixture of the initial pulled product (12b) and an adhesive matrix material to obtain the block product (12c), in particular, forming the block product (12c) from the initial pulled product (12b) by means of a vacuum or pressing procedure.

8. The method according to claim 7, comprising the subsequent step of
d) pulling the block product (12c) to obtain a finished pulled product (12d).

5

9. The method according to any one of the preceding claims, wherein the fibrous protein product (12) is a slaughter-free protein product resembling processed meat products.

10

10. The method according to any one of the preceding claims, wherein the wet textured product material (11) is an extrudate produced by high moisture extrusion cooking.

15

11. The method according to any one of the preceding claims, wherein a protein component of the wet textured product material (11) is selected from the group consisting of pea, soy, wheat, sunflower, pumpkin, rice, cereals, pulses, oil seeds, algae, single cells, fungi, and fermented components.

12. The method according to any one of the preceding claims, wherein a component of the wet textured product material (11) is selected from the group consisting of further plant cells, starch, flavours, spices, dietary fibres, hydrocolloids, salt, fat, oil, and fungal component, optionally muscle cells.

13. The method according to any one of the preceding claims, wherein the wet textured product material (11) comprises 10-65wt% of protein, in particular comprises 10-40wt% of protein.

14. The method according to any one of the preceding claims, wherein the wet textured product material (11) has an anisotropic structure.

35

15. The method according to any one of the preceding claims, wherein the wet textured product material temperature is within the range of 10°-100°C, in particular within the range of 30-90°C, during the de-
5 forming step a).

16. The method according to any one of the preceding claims, wherein step (a) is performed by means of rolling the wet textured product material (11) at
10 least once, in particular at least twice,
in particular by means of rolling the wet textured product material (11)
- in a direction (r1) parallel to a fibre orientation of the fibrous structure, and/or
15 - in a direction (r2) normal to the fibre orientation of the fibrous structure.

17. A product (12) obtained by the method according to any one of claim 1 to 16.
20

18. Product according to claim 17, which is a food product, in particular which food product resembles processed meat products.

19. A device for performing the method according to any one of the preceding claims 1 to 16, in particular for performing method step a), comprising
- rolling means (2) for elastic-plastically deforming the wet textured product material (11),
25 - in particular a feeding mechanism (21) for feeding the wet textured product material (11) into the rolling means (2).
30

20. The device according to claim 19, wherein
35 the rolling means comprise at least one pair of rolls (2), in particular two pairs of rolls (2), with a roller gap (rg1) with $rg1 \leq 0.8$ of the thickness h of the product material (11), in particular with $rg1 \leq 0.4$ of the thickness h of the product material(11).

21. The device according to any one of the claims 19 to 20, comprising pulling means (3), in particular for performing method step b), for pulling apart the deformed product (12a) to obtain a pulled product (12b),
5 in particular the pulling means (3) are arranged in series with the rolling means (2),
in particular, the pulling means (3) comprise a pair of pin-rolls (3).
10

22. A use of the device, in particular comprised of more than one device connected in sequence according to any one of the claims 19 to 21 for manufacturing of a fibrous protein product(12).
15