

Apparatus And Method For Poaching Whole Carcass Of Fowl

Field of Invention

[0001] The present invention relates to an apparatus and method for poaching or cooking any bird. In particular, the invention relates to a semi-automatic system for cooking whole carcasses of fowls in fluid or broth.

Background

[0002] Carcasses of fowls can be cooked in many different ways. An entire carcass may be poached in hot water, steamed, baked or grilled in an oven or over fire, a combination of steaming and grilling, and so on. The consistency of cooking fowls in a home environment may not be a very significant factor. However, consistency of cooking fowls in a commercial environment, such as, in a restaurant, has to be controlled and maintained, especially over a period of time and with different kitchen helpers.

[0003] For food safety, most fowls are now slaughtered in designated slaughter-houses. The carcasses are then kept in chillers for distribution to maintain food hygiene; others are kept frozen. Controlling and maintaining the consistency of cooking of an entire carcass may not appear to be simple because a carcass may be chilled or frozen to varying degrees. In addition, the carcasses may vary in sizes, ranging from a spring chicken of 6 weeks old and a weight of about 0.5 kg to a large bird weighing about 10 kg. Cooking an entire carcass is also a challenge because the thigh portions are thicker than the breast portions, thus, the breast portions are often cooked faster than the thigh portions; as a result, the texture of the cooked fowl is not uniform. When a carcass is overcooked, the tendons near the feet and joints of the wings are often torn; more often, the skin is broken. The appearance of an overcooked carcass is not desirable for a reputed eatery.

[0004] Carcasses of fowls are often cut and cooked in parts to overcome such non-uniform or inconsistent cooking of an entire bird. It can thus be seen that there exists a

need for an apparatus and a method for poaching or cooking whole carcasses in a fluid yet overcoming the non-uniform cooking experienced with existing methods.

Summary

[0005] The following presents a simplified summary to provide a basic understanding of the present invention. This summary is not an extensive overview of the invention, and is not intended to identify key features of the invention. Rather, it is to present some of the inventive concepts of this invention in a generalised form as a prelude to the detailed description that is to follow.

[0006] In one embodiment of the present invention, a method for poaching or cooking whole carcass of a fowl in fluid is provided. The method comprises: immersing thigh portions of the carcass in the fluid to level L2, and regulating the fluid to a first stage cooking temperature T2 for a cooking time t1; immersing the whole carcass in the fluid and regulating the fluid to a second stage cooking temperature T3 for an additional cooking time t2 after the first stage cooking time t1 has elapsed; and quenching the cooked carcass in cold fluid at a quenching temperature T4 for a quenching time t3.

[0007] In one embodiment of the cooking method, the second stage cooking temperature T3 is lower than the first stage cooking temperature T2. In another embodiment, the second stage cooking temperature T3 is higher than the first stage cooking temperature T2. The first and second stage cooking temperature is controlled by regulating a power of a stove.

[0008] In another embodiment of the cooking method, the carcass or fowl, supported on a jig, is oscillated to churn the cooking fluid during the first and/or second stage(s) of cooking.

[0009] In another embodiment of the present invention, an apparatus for poaching or cooking whole carcass of a fowl in fluid is provided. The apparatus comprises: a cooking pot disposed on a stove; a jig operable to support one or more carcasses,

wherein the jig is operable to be inserted into the cooking pot so that: thigh portions of the carcass(es) are immersed in fluid in the cooking pot in a first stage cooking process; the entire carcass(es) is/are submerged in the fluid in a second stage cooking process; and the cooked carcass(es) is/are quenched in cold fluid; and a stove to regulate temperature of the fluid in the first and second stages of the cooking process.

[0010] In one embodiment of the apparatus, the apparatus comprises a lifter arm. In another embodiment, a lifter arm drive system is provided to adjust the vertical height of the lifter arm. In addition, the lifter arm drive system is operable to oscillate the jig and carcass during the cooking process. In yet another embodiment, the lifter arm is pivoted to the lifter drive system such that the lifter arm is movable between a load/unload position and a cook position.

[0011] In another embodiment of the apparatus, the apparatus comprises a control system operable to monitor both the fluid level and temperature and depth of immersing the carcass(es) by controlling the height of the lifter, a fluid supply and/or power of the stove.

[0012] In one embodiment of the jig, the jig comprises a base plate; a elongate hanger having two ends, with one end being connected to a centre of the base plate and the other free-end connected to a cross-bar; and one or more support element(s), each supporting element for supporting a carcass in a vertical position by the body cavity. The cross-bar is operable to engage with a pair of hooks disposed at an end of the lifter arm.

[0013] In one embodiment of the stove, the stove is an induction stove. The cooking pot is accordingly made of a magnetic material.

Brief Description of the Drawings

[0014] This invention will be described by way of non-limiting embodiments of the present invention, with reference to the accompanying drawings, in which:

[0015] FIG. 1 illustrates a pot for cooking whole carcasses of fowls in fluid in accordance with an embodiment of a cooking method of the present invention;

[0016] FIG. 2 illustrates process temperatures and time in cooking whole carcasses in accordance with the cooking method of the present invention;

[0017] FIG. 3A illustrates an apparatus for use with the cooking method shown in FIG. 2; FIG. 3B illustrates a jig for supporting the carcasses; FIG. 3C illustrates a trolley for use with the apparatus; FIG. 3D illustrates a cooking pot for use with the apparatus; and FIG. 3E illustrates a detect plate of the lifter arm for use with the apparatus; and

[0018] FIG. 4A illustrates schematics of elements of the apparatus shown in FIG. 3A; FIGs. 4B and 4C illustrate the loading and unloading positions of a lifter of the apparatus shown in FIG. 3A; and FIGs. 4D-4F illustrate the sequence of the cooking method shown in FIG. 2.

Detailed Description

[0019] One or more specific and alternative embodiments of the present invention will now be described with reference to the attached drawings. It shall be apparent to one skilled in the art, however that this invention may be practised without such specific details. Some of the details may not be described at length so as not to obscure the invention. For ease of reference, common reference numerals or series of numerals will be used throughout the figures when referring to the same or similar features common to the figures.

[0020] FIG. 1 shows a cooking pot 10 with a carcass of a fowl F supported on a jig 20 in accordance with an embodiment of the present invention. As shown in FIG. 1, each jig 20 has a hanger 24 connected to a centre of a base plate 26. The free-end of the hanger 24 terminates with a cross-bar 22. The hanger 24 is dimensioned so that the cross-bar 22 extends above the top of cooking pot 10. On the base plate 26 is a plurality of support elements 28 on the same side as the hanger 24. The cooking pot 10 is sized to contain a plurality of carcasses F. The support elements 28 are spaced apart from each other so that the carcasses F to be cooked are uniformly spaced apart in the cooking pot 10. Each fowl F is slaughtered and the body cavity of each carcass emptied of its organs. The carcasses F to be cooked are then supported in an upright position by placing each carcass with its body cavity over each support element 28.

[0021] As shown in FIG. 1, the jig 20, with the carcasses F to be cooked, is then inserted into the cooking pot 10 containing a fluid such that the fluid at level L2 covers the thighs of the carcasses F at a first cooking temperature T2 for a predetermined cooking time t1 in a first stage of cooking. In a second stage of cooking, fluid is added until it reaches level L3 and covers the entire carcasses at a second cooking temperature T3 for a second predetermined cooking time t2. After the carcasses F are cooked, the jig 20 and the cooked carcasses F are immersed in a quenching pot 10a for a predetermined time t3. The quenching pot 10a contains cold fluid kept a quenching temperature T4. FIG. 2 shows the temperature profiles of the first and second stages of poaching whole carcasses F according to the present invention. As shown in FIG. 2, prior to cooking of the carcasses F, the cooking pot 10 is initially filled with fluid to level L1 at room temperature and is heated up to a temperature T1. After the lower parts including the thigh portions of the carcasses F are immersed in the fluid, the fluid temperature may drop and it may be heated up again to bring it up to the first stage cooking temperature T2. A variety of fluids may be used to prepare or cook fowls in the present invention. For example, water or broth or consommé is suitable.

[0022] With two stages of cooking of whole carcasses of fowls in the present invention, the breast portions, which have less bulk, are not overcooked more than the thigh portions. The meat at both the breast and thigh portions are cooked to about the same degree; such uniform or even cooking to the entire carcass F ensures that the

texture of the cooked fowls' meat is uniform and tender to eat. At the same time, tendons near the feet and in the joints of the wings are not torn due to overcooking, and the appearance, i.e. skin, of the cooked fowl is more pleasing.

[0023] In one embodiment of the cooking process, the fluid temperature T1 ranges from about 80°C to 100°C and the first stage cooking temperature T2 ranges from about 80°C to about 95°C. The corresponding second stage cooking temperature T3 ranges from about 75°C to about 85°C. If required, hot fluid is added into the cooking pot 10 to bring the fluid level to level L3; in addition or alternatively, fluid at room temperature is added into the cooking pot 10 and heated up to temperature T3. In another embodiment of the cooking process, the second stage cooking temperature T3 is higher than the first stage cooking temperature T2; for example, T2 ranges from about 75°C to about 90°C, whilst T3 ranges from about 85°C to about 95°C or more. In the above embodiments, the quenching temperature T4 ranges from room temperature to about 0°C. In an example, the quenching fluid is chilled with ice.

[0024] FIG. 3A shows a machine 100 for use with the cooking process of the present invention. As shown in FIG. 3A, the machine 100 has an L-shaped chassis 130. One section of the L-shaped chassis has a lifter drive system 140; the other section houses the electrical and electronics control system 160. The lifter drive system 140 drives a lifter arm 150 by means of a motor 142 and ball screw 144, and is guided in a vertical motion by linear guides. In one embodiment of the lifter drive system, the lifter drive system 140 includes a motor controller 143, an upper limit switch 146, a lower limit switch 147, a home position limit switch 148 and a cooker limit switch 149. The home position limit switch 148 is above the cooker limit switch 149 and both the home and cooker limit positions are intermediate the upper and lower limit switches. The first- and second- stage cooking positions are predetermined distances below the home switch position. All the limit switches are adjustable. Although the upper, lower and cooker limit switches are not required for the present invention to work, they are provided for safety purposes when the machine is switched to automatic or semi-automatic mode operation.

[0025] The lifter arm 150 is pivoted to the lifter drive system 140, and is operable to swing in a horizontal plane between to a load/unload position and a cook position. In both these positions, a detect lever 152 is provided at a free-end of the lifter arm 150 to engage a link 154 with a detent plate 156. Corresponding to the load/unload position, the detent plate 156 has a parking notch 157a; corresponding to the cook position, the detent plate 156 has a cook position notch 157b. Part of the lifter arm 150 with the detent plate 156 is shown in FIG. 3E. As shown in FIG. 3A, the free-end of the lifter arm 150 has a swivel joint 158. The swivel joint 158 has two spaced apart hooks 159 being arranged to engage with a cross-bar 122 on a jig 120. The jig 120, as shown in FIG. 3B, is constructed like the jig 20 described above and has a hanger 124, a base plate 126 and a plurality of support elements 128. In addition, the base plate 126 has a plurality of apertures 127. In one embodiment of the machine, the lifter arm 150 includes a position sensor at each of the load/unload and cook positions.

[0026] As shown in FIG. 3A, a stove 170 is located in a space between the two sections of the L-shaped chassis 130. The stove 170 defines the cook position of the lifter arm 150. On the chassis 130 near a side of the stove 170 and adjacent to the lifter arm 150 is a docking guide 172a. Near the docking guide 172a is a dock sensor 174a. In one embodiment of the stove, the stove 170 is an induction cooker. In another embodiment, the stove 170 is an electric stove. In yet another embodiment, the stove 170 is a burner stove. The cooking power of the stove 170 is regulated by a controller 171.

[0027] The docking guide 172a allows a trolley 180 to dock with the chassis 130. FIG. 3C shows an embodiment of the trolley 180. As shown in FIG. 3C, a side of the trolley has a cooperating docking guide 172b and a dock sensor target 174b. The docking guide 172a, 172b ensures that the position of the trolley 180 with respect to the stove 170, lifter arm 150 and other parts of the machine 100 is constantly determinate. When the trolley 180 is docked, the trolley 180 defines the load/unload position of the lifter arm 150.

[0028] A cooking pot 110 is sized and selected to contain the jig 120 and a predetermined number of birds, and according to the size of the stove 170, reach of the lifter arm 150 and the load on the lifter drive system 140. FIG. 3D shows an

embodiment of the cooking pot 110. As shown in FIG. 3D, the cooking pot 110 has a sensor compartment 112 on a vertical but external side of the cooking pot 110. In the sensor compartment 112, there is a temperature sensor 113 and three level sensors 114; the fluid levels L2 and L3 define two positions of the level sensors 114. The lowest level sensor is provided to detect presence of fluid in the cooking pot 110 as a safety feature, which may interlock with the stove controller 171. Wires from these sensors 113, 114 are terminated in a sensor connector 115. In addition, the cooking pot 110 has a fluid inlet port 116, an overflow port 117 and a discharge port 118. As shown in FIG. 3D, the inlet port 116 and overflow port 117 are located near the rim of the cooking pot 110 whilst the discharge port 118 is located near the bottom of the cooking pot. In one embodiment of the inlet pot, the inlet port 116 is additionally fitted with a quick-disconnect coupling for ease of use. In another embodiment, the outlet pot 118 is additionally fitted with a manual valve, such as a ball valve. Of course, the cooking pot 110 is also fitted with handles 119 on the exterior surface. When the stove 170 is an induction cooker, the cooking pot 110 for use with the induction cooker 170 has to be made of a ferrous or magnetic material, such as, martensitic stainless steel.

[0029] In the cooking process of the present invention, as described above, the cooked fowls F are quenched in fluid after cooking. The cooking machine 100 is provided with a quenching pot 110a. The quenching pot 110a is substantially the same size and dimensions as the cooking pot 110 but without the sensor compartment 112. The quenching pot 110a may have a drain port like that of the discharge port 118; a valve may additionally be fitted to the drain port. In one embodiment of the machine, the cooking pot 110 and the quenching pot 110a have different sensor identities but share one trolley 180. In another embodiment, the cooking pot 110 and the quenching pot 110a are placed on different trolleys 180, 180a having different sensor identities.

[0030] The electrical and electronic control system 160 includes a display/touch screen 162 interface with the machine and a programmable logic controller (PLC) 164 (shown schematically in FIG. 4A). The machine 100 is programmed to operate in an automatic or semi-automatic mode. In addition, a manual mode is provided. A mode switch is provided at the lifter arm 150 for automatic/manual mode selection. Input signals to the PLC include wires from the temperature sensor 113, fluid level sensors 114, docking

sensor 174, lifter arm load/unload position sensor, lifter arm cook position sensor, upper/lower/home position switches of the lifter drive system 140, automatic/manual mode and emergency stop switches. Outputs from the PLC include signals to the lifter motor controller 143, stove controller 171 and a solenoid 190 connected to the fluid supply and inlet port 116. Internal PLC controls include timer and relay interlocks, for example to cater for safer operation of the machine 100.

[0031] FIG. 4A shows a schematic of the machine 100. FIG. 4B shows the vertical positions of the jig 120 when the lifter arm 150 is at the load/unload and cooking positions; FIG. 4C shows the vertical positions of the jig 120 when the lifter arm 150 is at the quenching position. FIG. 4D-4F show the positions of the jig 120 during the cooking process. The movement of the jig 120, operable under semi-automatic mode of the machine 100, during the cooking process of the present invention is described below. In the following description, the carcasses of fowls F to be cooked are assumed to be prepared, put on the support elements 128 and placed on the trolley 180 prior to operation of the machine 100. In addition, the cooking pot 110, filled with fluid to level L1, is also assumed to be heated to temperature T1.

[0032] As shown in FIG. 4B, the trolley 180 is docked with the stove 170 when the lifter arm 150 is at the radial load/unload position and at a height defined by the home position 148 of the lifter drive system 140. At the home position 148 of the lifter drive system 140, the jig 120 is clear of the top of the cooking pot 110 when the cooking pot 110 is on the trolley 180 or the stove 170. The lifter arm 150 is then lowered by a predetermined height, as controlled by the control system 160, so that a user can engage the hooks 159 with the cross-bar 122. The user then activates a relevant button on the display/touch screen 162 to continue the jig's movements. The jig 120 is then returned to the vertical home position 148 and the control system 160 then prompts the user to swing the lifter arm 150 from the load/unload position to the cooking position. When the cooking position sensor of the lifter arm 150 is activated, the lifter arm 150 is locked at the cook detent notch 157b and the user activates another button on the display/touch screen 162, the control system 160 continues to lower the jig 120 into the cooking pot 110 until the first stage cooking position 149 is reached. The jig 120 and fowls F are then suspended in the cooking pot 110 for a predetermined first stage

cooking time t_1 with the thigh portion of the carcasses F immersed in the fluid at temperature T2. After the first stage cooking time t_1 has elapsed, the control system 160 activates the solenoid 190 valve connected to the fluid supply and inlet port 116 to add a predetermined amount of fluid into the cooking pot. The lifter arm 150 is then lowered to the second stage cooking position so that the partially cooked carcasses F are fully submerged in the fluid. The second stage cooking temperature is controlled by regulating the stove controller 171 to temperature T3 and is maintained for a second stage cooking time t_2 . Once the second stage cooking time t_2 has elapsed, the control system 160 raises the lifter arm 150 to its home 148 position and alerts the user to continue with the quenching step.

[0033] Before the carcasses F are cooked, the user places the quenching pot 110a on the trolley 180, 180a, fills the quenching pot 110a with cold fluid and docks the trolley 180, 180a with the stove 170. Once the quenching pot 110a is in position and the lifter arm 150 with the cooked fowls F is in the lifter arm's home 148 position, the user swings the lifter arm 150 back to its load/unload position. When the lifter arm 150 is returned to its load/unload position and the parking notch 157a is locked, the control system 160 lowers the jig 120 and the cooked fowls into the quenching pot 110a. The cooked fowls are kept in the cold fluid for a predetermined time t_3 before the lifter arm 150 is brought back to its vertical home position 148. The cooking pot 110, with its fluid used in the cooking process drained into another pot, or another empty pot 110, 110a is placed on the trolley 180, 180a, which is then docked with the stove 170. The cooked fowls are lowered into the pot, the hooks 159 disengaged from the cross bar 122 and the trolley and cooked fowls are then moved away from the machine 100.

[0034] With the cooking machine 100 of the present invention, the carcass or cooked fowls F at the machine 100 is not manually handled by a user. This ensures that hygiene during the cooking process is maintained; in addition, cross-contamination is minimised.

[0035] In another embodiment of the cooking process of the present invention, as shown in FIG. 4F, the control system 160 activates the lifter drive system 140 and the jig 120 to oscillate in a vertical manner when the entire fowls F are in the second stage

cooking process. In addition or alternatively, the jig 120 is activated to oscillate vertically when the fowls F are in the first stage cooking process. By oscillating the jig 120 in a vertical manner, fluid in the cooking pot 110 is churned to flow through the apertures 127 of the base plate 126 and the temperature in the fluid becomes more uniform, resulting in more even cooking of the fowls' meat.

[0036] While specific embodiments have been described and illustrated, it is understood that many changes, modifications, variations and combinations thereof could be made to the present invention without departing from the scope of the invention. For example, a limit switch at the home position is used and other cooking positions are relatively determined by an encoder. In another example, a stepper or servo motor may be used instead of a DC or AC motor; a fluid motor may be used instead of an electric motor; a linear motor may be used instead of a rotary motor. In another example, the lead screw lifter drive may be used instead of a ball screw drive; a rope or chain drive system may be used instead of the screw drive system. In another example, the jig may include a rotary drive system to churn the fluid during the cooking process in addition or alternative to the vertical oscillation of the jig. In another example, the level sensor may be analog (such as capacitive) or distance sensing (such as infra-red) type instead of discrete switches. In a further example, a pin and socket joint may be used instead of the hooks and cross-bar joint. In yet a further example, manual control with human vision and power may be used instead of the electrical/electronic control system 160. Additional processing of the fowls before or after cooking may be introduced, for example, by immersing the carcass in sauces or other seasonings. Additional processing may further include dipping the cooked carcass in hot oil to turn the skin brown and/or crispy.

CLAIMS:

1. A method for poaching or cooking whole carcass of a fowl in fluid, said method comprising:
 - immersing thigh portions of the carcass in the fluid to level L2, and regulating the fluid to a first stage cooking temperature T2 for a cooking time t1;
 - immersing the whole carcass in the fluid and regulating the fluid to a second stage cooking temperature T3 for an additional cooking time t2 after the first stage cooking time t1 has elapsed; and
 - quenching the cooked carcass in cold fluid at a quenching temperature T4 for a quenching time t3.
2. A method according to claim 1, wherein the second stage cooking temperature T3 is lower than the first stage cooking temperature T2.
3. A method according to claim 1, wherein the second stage cooking temperature T3 is higher than the first stage cooking temperature T2.
4. A method according to any one of the preceding claims, further comprising oscillating the fowl to churn the fluid so that the first and/or second stage cooking temperature(s) is/are uniform.
5. A method according to any one of the preceding claims, wherein immersing the whole carcass in the fluid comprises lowering the whole carcass into the fluid and regulating a fluid supply.
6. A method according to claim 5, wherein regulating the first and second stage cooking temperatures comprises regulating a power of a stove.
7. A method according to any one of the preceding claims, wherein the carcass comprises a plurality of carcasses, said carcass(es) is/are supported on a jig by support element(s) holding the empty body cavity of said carcass(es).

8. A method according to claim 7, wherein the jig has a base plate to carry the support element(s) and said base plate has one or more aperture(s).
9. A method according to claim 8, wherein churning the fluid in claim 4 is facilitated by the one or more aperture(s).
10. An apparatus for poaching or cooking whole carcass of a fowl in fluid, said apparatus comprises:
 - a cooking pot disposed on a stove;
 - a jig operable to support one or more carcasses, wherein the jig is operable to be inserted into the cooking pot so that: thigh portions of the carcass(es) are immersed in fluid in the cooking pot in a first stage cooking process; the entire carcass(es) is/are submerged in the fluid in a second stage cooking process; and the cooked carcass(es) is/are quenched in cold fluid; and
 - a stove to regulate temperature of the fluid in the first and second stages of the cooking process.
11. An apparatus according to claim 10, further comprising a fluid supply to the cooking pot.
12. An apparatus according to claim 10 or 11, further comprising a lifter arm operable to support the jig and fowl(s).
13. An apparatus according to claim 12, wherein the lifter arm further comprises a lifter drive system operable to adjust the vertical height of the lifter arm.
14. An apparatus according to claim 13, further comprising a control system operable to monitor both the fluid level and temperature and depth of immersing the carcass(es) by controlling the height of the lifter, fluid supply and/or power of the stove.

15. An apparatus according to any one of claims 10-14, wherein the lifter arm is pivoted so that the lifter arm is operable to be moved from a load/unload position to a cook position, said cook position being defined by the stove position.
16. An apparatus according to claim 15, further comprising a trolley, said trolley being operable to dock with the stove and the trolley position defines the load/unload position.
17. An apparatus according to any one of claims 10-16, wherein the jig comprises a base plate; a elongate hanger having two ends, with one end being connected to a centre of the base plate and the other free-end connected to a cross-bar; and one or more support element(s), each supporting element for supporting a carcass in a vertical position by the body cavity.
18. An apparatus according to claim 17, wherein the base plate comprises one or more apertures.
19. An apparatus according to any one of claims 12-18, wherein the lifter arm further comprises a swivel joint at a free-end of the lifter arm.
20. An apparatus according to claim 16, wherein the swivel arm further comprises a pair of hooks, said pair of hooks being operable to engage with the cross-bar of the jig.
21. An apparatus according to any one of claims 10-20, wherein an output power of the stove is regulated by a stove regulator.
22. An apparatus according to claim 21, wherein the stove is an induction stove and the cooking pot is accordingly made of a magnetic material.
23. A whole fowl poached or cooked according to any one of the method claims 1-9.

24. A kitchen for preparing whole fowl in accordance with any one of the method claims 1-9.

25. An eatery where whole fowls poached or cooked according to any one of the method claims 1-9 are served or to be served.

26. A whole fowl poached or cooked with an apparatus defined by any one of claims 10-22.