A method and apparatus for injecting chilled water (16) into freshly slaughtered and eviscerated poultry carcasses immediately prior to introducing the poultry carcasses into a conventional chiller (20). The chilled water (16) may be at a temperature slightly above the freezing point of water. The chilled water injector (10) is mounted to the entrance end (21) of a chiller (20). The poultry carcasses are removed from a shackle line and placed on a conveyor (11) which conveys the warm carcasses into and through the injector (10). In the injector (10), needles (13) inject chilled water (16) into the carcasses thereby beginning the chilling process. The injected carcasses then drop into the conventional chiller (20) where they are conveyed from the entrance end (21) to the exit end (22) through a counter-flow of chilled water (23) during which time further chilling occurs.
METHOD AND APPARATUS FOR CHILLED WATER INJECTION

TECHNICAL FIELD

[0001] The present invention relates to the processing of poultry, and in particular, to a method and apparatus for the chilling of freshly slaughtered and eviscerated poultry carcasses by chilled water injection.

BACKGROUND ART

[0002] In modern poultry processing plants, the birds are first slaughtered and then eviscerated. The eviscerated carcasses are at a temperature of around 38° C. (100° F.) and must be cooled rapidly to avoid the proliferation of bacteria. The chilling of the eviscerated carcasses is typically carried out in a chiller which comprises a chilled water bath. The eviscerated carcasses are maintained in the chiller for a sufficient residence time to chill them to a temperature only slightly above the freezing point of water. Poultry chillers of the “auger type” commonly used in poultry processing are described in U.S. Pat. Nos. 6,089,037 and 6,397,622. Such chillers can be in excess of 31 meters (100 feet) in length in order to obtain sufficient residence time to chill the poultry carcasses to the desired final temperature. The residence time depends on the rate of heat transfer from the carcasses to the chilled water and is limited by the rate of heat transfer from the interior to the surface of the poultry carcass. In addition, pre-chillers and post-chillers may also be used to extend the residence time of the poultry carcasses in the chilled water. Chillers therefore have a large “footprint” in a poultry processing plant and it is desirable to reduce this footprint and to reduce the processing time, both for the sake of efficiency and to reduce the potential for bacterial contamination.

[0003] Injectors are used in poultry processing to introduce liquids containing salts, flavoring agents, marinates and the like into the poultry carcasses. These injectors use a plurality of needles to inject the liquids under pressure into the flesh of the poultry carcasses. An example of an injector is described in U.S. Pat. No. 5,505,972.

[0004] References mentioned in this background section are not admitted to be prior art with respect to the present invention.

[0005] The limitations of the prior art are overcome by the present invention as described below.

DISCLOSURE OF THE INVENTION

[0006] The present invention is directed to a method and apparatus for injecting chilled water into freshly slaughtered and eviscerated poultry carcasses to rapidly chill the carcasses. An apparatus of the present invention comprises an injector to inject chilled water into the poultry carcasses immediately prior to introducing the poultry carcasses into a conventional chiller. The chilled water, which may be at a temperature slightly above the freezing point of water, is able to immediately begin the chilling process since the chilled water is introduced into the warm interior of the carcass and is not limited by the rate of heat transfer from the interior to the surface of the carcass. As a result the carcass is cooled more rapidly and does not require the extended residence time in the chiller needed for conventional chilling. The length of the chiller can be reduced, pre-chilling and post-chilling eliminated and bacterial contamination reduced.

[0007] A chilled water injector is preferably mounted to the entrance end of the chiller. The freshly slaughtered and eviscerated poultry carcasses are removed from a shackle line and placed on a conveyor which conveys the warm carcasses past the injector. In the injector, needles inject chilled water into the carcasses thereby beginning the chilling process. The injected carcasses then drop into a conventional chiller (for example, an auger type chiller) where they are conveyed from the entrance end to the exit end through a counter-flow of chilled water during which time further chilling occurs. At the exit end of the chiller, the chilled carcasses are removed by conventional means and continue to further processing steps.

[0008] These and other features, objects and advantages of the present invention will become better understood from a consideration of the following detailed description of the preferred embodiments appended claim in conjunction with the drawings as described following.

BRIEF DESCRIPTION OF THE DRAWINGS

[0009] FIG. 1 is a side elevation view of an auger-type chiller having a chilled water injector mounted to an entrance end of the chiller.

BEST MODE FOR CARRYING OUT THE INVENTION

[0010] With reference to FIG. 1, the preferred embodiments of the present invention may be described as follows:

[0011] A chilled water injector 10 is mounted to an entrance end 21 of a chiller 20. While FIG. 1 illustrates an auger-type chiller, the present invention is not limited to this type of chiller but may be used with any type of chiller.

[0012] The freshly slaughtered and eviscerated poultry carcasses are removed from a shackle line (not shown) and placed on a conveyor 11 which conveys the warm carcasses past the injector 12. In the injector 12, a plurality of needles 13 are disposed within a head 14. The head 14 may comprise an upper and a lower manifold plate (not shown) providing a conduit through which the chilled water passes. An optional air head may be attached to the head 14 allowing the needles 13 to retract when they encounter a bone in a poultry carcass.

[0013] A pump 15 receives chilled water 16 from a source of chilled water which may be any type of refrigeration apparatus known to those skilled in the art. The pump 15 increases the pressure of the chilled water 16 and delivers the pressurized chilled water 16 to the needles 13 through a delivery line 17.

[0014] The head 14 moves up and down, for example by 10 to 20 centimeters (4 to 8 inches), as the conveyor 11 indexes forward, for example by 10 to 20 centimeters (4 to 8) inches at a time.

[0015] The needles 13 inject the pressurized chilled water 16 into the poultry carcasses thereby beginning the chilling process. The chilled water 16 may also include brines, flavorings and other additives as known in the art. The injected carcasses then drop onto the conveyor 11 and thence into the chiller 20 where they are conveyed from the entrance end 21 to an exit end 22 through a counter-flow of chilled water 23 during which time further chilling occurs. At the exit end 22 of the chiller 20, the chilled carcasses are removed by conventional means and continue to further processing steps.
INDUSTRIAL APPLICABILITY

[0016] The present invention injects chilled water into freshly slaughtered and eviscerated poultry carcasses immediately prior to introducing the poultry carcasses into a conventional chiller. The chilled water is able to immediately begin the chilling process since the chilled water is introduced into the warm interior of the carcass and is not limited by the rate of heat transfer from the interior to the surface of the carcass. As a result the carcass is cooled more rapidly and does not require the extended residence time in the chiller needed for conventional chilling. The length of the chiller can be reduced, pre-chilling and post-chilling eliminated and bacterial contamination reduced.

[0017] The present invention has been described with reference to certain preferred and alternative embodiments that are intended to be exemplary only and not limiting to the full scope of the present invention as set forth in the appended claims.

1. A method for chilling freshly slaughtered and eviscerated poultry carcasses, comprising the step of injecting the poultry carcasses with chilled water.

2. The method of claim 1 comprising the step, subsequent to the step of injecting the poultry carcasses with chilled water, of introducing the poultry carcasses to a chiller.

3. The method of claim 2, wherein said chiller is an auger-type chiller.

4. The method of claim 1 wherein said step of injecting chilled water comprises injecting chilled water with a needle injector.

5. The method of claim 1, wherein said chilled water further comprises an additive.

6. The method of claim 5, wherein said additive is selected from the group consisting of brines and flavorings.

7. An apparatus for chilling freshly slaughtered and eviscerated poultry carcasses, comprising:
   a source of chilled water;
   an injector operatively connected to said source of chilled water;
   and
   means for moving said poultry carcasses past said injector.

8. The apparatus of claim 7 comprising a chiller following said injector.

9. The apparatus of claim 8, wherein said chiller is an auger-type chiller.

10. The apparatus of claim 7 wherein said injector comprises a needle injector.

11. The apparatus of claim 7, wherein said source of chilled water comprises a refrigeration apparatus.

12. The apparatus of claim 7, further comprising means for introducing an additive to said chilled water.

13. The apparatus of claim 12, wherein said additive is selected from the group consisting of brines and flavorings.

14. The apparatus of claim 7, further comprising means for pressurizing said chilled water.

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