3. The shell egg pasteurization system recited in claim 2 wherein the batch processing control system contains a plurality of pasteurization protocols each based on a designated size and start temperature of shell eggs in a batch, and said system further comprises a user interface that is configured to enable an operator to select an appropriate pasteurization protocol for the size and start temperature of a batch of shell eggs being pasteurized.

4. The shell egg pasteurization system recited in any preceding claims further comprising a pressurized air supply system having ~~an adjustable level of air pressure~~a compressed air source and a flow control valve in communication with the bath, wherein the pasteurization protocol also sets ~~the~~ a level of pressurized air ~~pressure~~ flowing into the bath for the designated size and start temperature of shell eggs in a respective batch, and the batch processing control system is further configured to control operation of the flow control valve of the pressurized air supply system in accordance with said pasteurization protocol to control the level of pressurized air ~~pressure of air~~ flowing into the bath.

5. The shell egg pasteurization system recited in claim 1 wherein the cooling system comprises at least one electronic cold water valve controlled by the batch processing control system in response to signals from at least one temperature sensor in the bath to add cold water into the bath in order to lower the temperature of the water in the bath when necessary to maintain the temperature of the water in the bath below said upper temperature limit.

6. The shell egg pasteurization system recited in claim 5 wherein the batch processing control system is programmed with a proportional-integral-derivative algorithm for controlling said electronic cold water valve to maintain the temperature of the water in the bath below the upper temperature limit.

7. The shell egg pasteurization system recited in claim 2 wherein each of the individually controlled heating elements comprises a heating coil located in one of the zones of the bath and an electronically controlled valve associated with the respective heating coil to control the flow of heated water through the respective heating coil, and the batch processing control system further comprises a programmable logic controller that is programmed with a proportional-integral-derivative algorithm for each of the individually controlled heating coils, each said proportional-integral-derivative algorithm using a temperature set point value defined by the pasteurization protocol and receiving a temperature feedback signal provided to the programmable logic controller

from at least one temperature sensor associated with the respective heating coil, and wherein each of said proportional-integral-derivative algorithms generates a heating control signal that is transferred from the programmable logic controller to control operation of the electronically controlled valve associated with the respective heating coil.

8. The shell egg pasteurization system as recited in claim 7 wherein the heating system comprises a boiler for heating water to a predetermined boiler temperature and the programmable logic controller in the batch processing control system further comprises a proportional-integral-derivative algorithm to control the operation of the boiler, said proportional-integral-derivative algorithm for the boiler receiving a temperature feedback signal provided to the programmable logic controller from a temperature sensor associated with the boiler, and generating a boiler control signal that is transmitted from the programmable logic controller to electronically control operation of the boiler.

9. A shell egg pasteurization system comprising:

a pasteurization bath containing water and having a series of at least two continuous zones;

at least one temperature sensor in each zone of the bath for measuring the temperature of the water in the bath;

a heating system that selectively increases the temperature of the water in each zone of the bath, said heating system including at least one independently controlled heating element in each zone of the bath;

a batch carrier arrangement that holds batches of shell eggs in the bath and includes an advance motor that moves the batch carrier arrangement and thereby the respective batches of shell eggs through and between zones;

a pressurized air supply system having ~~an adjustable level of air pressure~~a compressed air source and a flow control valve in communication with the water in the bath;

a batch processing control system that includes control software containing a plurality of predetermined pasteurization protocols based on a designated size and start temperature of shell eggs in a batch and sets a temperature set point value for the water in the bath, a level of ~~air pressure for~~ pressurized air flowing into the bath for the designated size and start temperature of shell eggs in a respective batch and a total dwell time in the bath for each batch, said control software being

configured to enable an operator to select an appropriate protocol for the size and start temperature of a batch of shell eggs being pasteurized;

wherein the batch processing control system receives signals from the at least one temperature sensor in each zone of the bath and is configured to control the heating system to independently raise the temperature of the water in each zone of the bath toward the temperature set point of a selected pasteurized protocol in response to signals from the at least one temperature sensor in each respective zone, is also configured to control operation of the flow control valve in the pressurized air supply system in accordance with the selected pasteurization protocol to control the level of ~~air pressure of~~ pressurized air flowing into the water in the bath, and is further configured to control the advance motor of the batch carrier arrangement to move the batches of shell eggs through the series of zones in the bath and hold each batch of shell eggs in the water for the total dwell time of the selected pasteurization protocol.

10. A shell egg pasteurization system as recited in claim 9 wherein each of the individually controlled heating elements comprises a heating coil located in the respective zone of the bath and an electronically controlled valve associated with the respective heating coil to control flow of heated water through the respective heating coil; and

the batch processing control system comprises a programmable logic controller that is programmed with a proportional integral derivative algorithm for each of the individually controlled heating coils, each said proportional integral derivative algorithm using a temperature set point value defined by the selected pasteurization protocol and receiving a temperature feedback signal provided to the programmable logic controller from at least one temperature sensor in the zone of the bath associated with the respective heating coil, wherein each of said proportional-integral-derivative algorithms generates a heating control signal that is transferred from the programmable logic controller to the electronically controlled valve associated with the respective heating coil.