CLAIMS:

1. A machine for food waste processing, comprising:

a power supply;

a control system coupled to the power supply;

a mixing drum defining a mixing chamber and having a volumetric capacity of 2000 litres or less;

a mixing shaft having mixing blades extending from the mixing shaft, the mixing shaft being configured to rotate to move the mixing blades within the mixing chamber;

an ioniser coupled to the power supply and arranged to provide a source of air that is rich in reactive oxygen species;

a heater and a fan coupled to the power supply and arranged to receive the source of air, the heater and fan cooperating to provide a source of heated gas rich in ionised oxygen to the mixing chamber, wherein the heated gas is between about 50 and about 70 degrees C and/or wherein the environment in the processing drum is heated to a temperature in the range of 50 to 70 degrees C;

a motor arranged to draw power from the power supply and to drive rotation of the mixing shaft;

wherein the mixing drum defines an input aperture to receive food waste and an outlet to disgorge processed waste residue;

wherein the control system is configured to operate the motor to drive the mixing shaft for multiple hours while monitoring operating parameters of the machine in order to produce a processed waste residue, wherein the residue comprises or consists essentially of substantially dried particulate.

2. The machine of claim 1, wherein the control system is configured to monitor the power draw of the motor and to determine a time of peak power draw of the motor.

3. The machine of claim 1 or 2, wherein the control system is configured to determine that the processed waste residue is ready for disgorgement from the outlet based on one or more process completion conditions.

4. The machine of claim 3, wherein the one or more completion conditions include a predetermined time elapsing after the time of peak power draw.

5. The machine of claim 4, wherein the predetermined time is between about 4 hours and about 7 hours.

6. The machine of any one of claims 3 to 5, wherein the machine comprises a humidity sensor to sense humidity in the mixing chamber, and wherein the one or more completion conditions include a humidity level in the mixing chamber being below a humidity threshold.

7. The machine of any one of claims 3 to 6, wherein the machine comprises a temperature sensor to sense air temperature in the mixing chamber or at an exhaust outlet of the mixing drum, and wherein the one or more completion conditions include a sensed temperature level of the temperature sensor being within a predetermined temperature range.

8. The machine of any one of claims 1 to 7, wherein the outlet is disposed in an outer wall of the drum at a position that is vertically above a position of the mixing shaft.

9. The machine of any one of claims 1 to 8, wherein the mixing shaft has at least one scoop coupled thereto, the at least one scoop being configured to carry processed waste residue to the position of the outlet.

10. The machine of claims 1 to 9, wherein the control system is configured to automatically initiate disgorgement of processed waste residue in response to determining that the processed waste residue is ready for disgorgement.

11. The machine of claim 10, wherein the control system monitors a weight of the drum during disgorgement to monitor the weight of disgorged residue and to determine the weight

of residue remaining in the drum, wherein the control system is configured to cease disgorgement of processed waste residue when the weight of residue remaining in the drum reaches a predetermined minimum threshold level, whereby an amount of at least 20 kg of processed waste residue remains in the drum after disgorgement ceases.

12. The machine of claim 11, wherein at least 50 kg of processed waste residue remains in the drum after disgorgement ceases.

13. The machine of claim 11, wherein at least 100 kg of processed waste residue remains in the drum after disgorgement ceases.

14. A process for rapid food waste decomposition, comprising:

loading a mass of food waste into a processing chamber defined by a processing drum of a waste processing machine that comprises a shaft and a plurality of blades coupled to the shaft and extending away from the shaft;

rotating the shaft to cause the blades to break down food waste present in the processing drum;

supplying heated air into the processing drum while the shaft is rotating, wherein the environment in the processing drum is heated to a temperature in the range of 50 to 70 degrees Celsius and/or wherein the heated air is supplied at a temperature of between about 50 to about 70 degrees Celsius,

wherein the heated air is rich in radicalised and/or ionised oxygen;

extracting air from the drum to remove airborne moisture from the drum;

monitoring processing conditions relating to the processing drum while the shaft is rotating;

determining that the processing conditions satisfy process completion criteria; and

removing residue of the processed food waste from the processing chamber;

wherein when the completion criteria are satisfied, the moisture content of the residue is about 30% or less.

15. The process of claim 14, wherein the removing is controlled in order to leave a minimum weight of residue in the processing drum.

16. The process of claim 15, wherein the removing comprises transferring the residue into a hatch in an end wall of the drum.

17. The process of claim 15 or claim 16, wherein the minimum weight of residue is determined as the greater of: a predetermined percentage of the total weight of organic material in the drum at the time of loading the mass of food waste into the processing drum; or a preset minimum weight.

18. The process of claim 16, wherein the hatch is disposed at a level that is vertically above the level of the shaft.

19. The process of claim 18, wherein the transferring comprises elevating the residue to the level of the hatch.

20. The process of claim 18 or claim 19, wherein the transferring comprises scooping residue into the hatch using at least one of the blades or a scoop coupled to the shaft.

21. The process of any one of claims 14 to 20, wherein the processing conditions comprise at least one of: power draw of a motor driving the shaft; peak power draw of a motor driving the shaft; air temperature inside the processing chamber; humidity of air inside the processing chamber; elapsed time since a time at which the last mass of food waste was loaded into the processing chamber; a current weight of residue in the processing chamber relative to a starting weight of loaded food waste at the time at which the last mass of food waste was loaded into the processing chamber; a percentage weight reduction of the loaded food waste.

22. The process of any one of claims 14 to 21, further comprising monitoring power draw of a motor driving rotation of the shaft over time to determine a time of peak power draw over a processing period.

23. The process of claim 22, wherein the monitoring power draw comprises setting a beginning of the processing period as the time at which the last mass of food waste was loaded into the processing chamber.

24. The process of claim 22 or claim 23, further comprising resetting the beginning of the processing period in response to determining that a further mass of food waste has been loaded into the processing chamber.

25. The process of any one of claims 14 to 24, further comprising monitoring an open or closed status of a loading hatch of the waste processing machine.

26. The process of any one of claims 14 to 25, further comprising monitoring an output of load sensors coupled to the processing drum to determine a weight of the mass of food waste loaded into the processing chamber.

27. The process of any one of claims 14 to 26, wherein removing the residue comprises continuing to rotate the shaft and discontinuing supplying the heated air.

28. The process of any one of claims 14 to 27, wherein when the completion criteria are satisfied, the weight of the loaded mass of food waste is reduced by between about 50% and 90%.

29. The process of claim 28, wherein when the completion criteria are satisfied, the weight of the loaded mass of food waste is reduced by between about 60% and 90%.

30. The process of claim 28, wherein when the completion criteria are satisfied, the weight of the loaded mass of food waste is reduced by between about 70% and 90%.

~~31. (Cancelled)~~

~~32~~31. The process of claim 14, wherein when the completion criteria are satisfied, the moisture content of the residue is between about 30% and about 10%.

~~33. A method of waste processing, comprising:~~

~~receiving a batch load of food waste into a processing drum;~~

operating the processing drum for a period of time and, during the operating, physically breaking down, aerating and warming the food waste, wherein the warming comprises heating an environment in the processing drum to a temperature less than 100 degrees C and comprises extracting moisture from the environment, and wherein the aerating comprises blowing air that is rich in radicalised and/or ionised oxygen onto the food waste;

determining that processing conditions in the processing drum are satisfied for completion of operation of the processing drum;

removing residue of food waste from the processing drum while leaving at least 50 kg of residue in the processing drum.

34. The method of claim 33, wherein the determining comprises determining a time of peak power draw of a motor driving rotation of a mixing shaft within the processing drum, and determining that a predetermined time period has elapsed since the time of peak power draw.

35. The method of claim 34, wherein the predetermined time period is a selected period in the range of about 4 to 12 hours.

36. The method of claim 35, wherein the selected period is in the range of about 4 to 7 hours.

37. A method of waste processing, comprising:

receiving a batch load of food waste into a processing drum;

introducing into the processing drum a quantity of food waste residue from processing of a previous batch load of food waste;

operating the processing drum for a period of time and, during the operating, physically breaking down, aerating and warming the food waste, wherein the warming comprises heating an environment in the processing drum to a temperature less than 100 degrees C and comprises extracting moisture from the environment, and wherein the aerating comprises blowing air that is rich in radicalised and/or ionised oxygen onto the food waste;

monitoring operation of the processing drum;

determining based on the monitoring that processing conditions in the processing drum are satisfied for completion of operation of the processing drum;

removing residue of food waste from the processing drum.

38. The method of claim 37, wherein the removing is performed while leaving between about 200 kg and about 50 kg of residue in the processing drum.

39. The method of any one of claims 33 to 38, further comprising introducing the removed residue to an anaerobic digester.

40. The method of any one of claims 33 to 39, wherein the environment in the processing drum is heated to a temperature in the range of 50 to 70 degrees C.

41. The method of any one of claims 33 to 40, wherein the determining comprises determining that a predetermined time has elapsed from a time of peak power draw of the processing drum.

42. A waste processing system comprising a processing drum having an outlet hatch, wherein the outlet hatch is configured, when open, to direct a stream of air along an upper surface of the hatch in order to facilitate egress of processed waste through the hatch.

43. A food waste processing system, comprising:

a food waste processing machine comprising a loading hatch, a processing drum and an outlet hatch;

a loader to receive a bin of food waste to be loaded into the food waste processing machine and to manipulate the bin to load the food waste into the processing drum through the loading hatch;

a reader disposed on or adjacent the food waste processing machine or the loader and arranged to read a unique identifier from a machine-readable element on or carried by the bin;

a controller to control operation of the food waste processing machine and the loader and to receive an output of the reader, wherein the controller is configured to determine the unique identifier based on the output of the reader and to transmit the unique identifier to a server to enable tracking of usage of the waste processing machine.

44. A waste processing system comprising:

an outlet hatch at an outlet end of a processing drum, the outlet hatch being positioned above a level of a processing shaft in the drum and having an outlet to direct processed waste passing through the hatch downwardly toward a collection bin; and

a level sensor positioned to detect a level of waste residue in the collection bin when the collection bin is positioned below the outlet of the outlet hatch.

45. The system of claim 44, further comprising a position sensor at or near the outlet end of the processing drum and arranged to detect a presence or absence of the collection bin below the outlet of the outlet hatch.

46. A waste processing drum, comprising:

a mixer to rotate within the drum about a horizontal axis;

a horizontally extending series of apertures in a curved lower side wall of the drum;

air directors or hoods to direct air passing through the apertures into the drum downwardly along the side wall.

47. The drum of claim 46, wherein the air directors or hoods have a low profile to avoid projecting into an interior of the drum by more than about 30 mm, optionally about 20 mm.

48. An organic waste processing machine, comprising:

a controller;

a processing drum comprising an agitator;

a heater;

a first fan responsive to the controller to force air through the heater and deliver heated air to the processing drum;

a second fan responsive to the controller to extract air from the processing drum;

wherein the controller controls the first and second fans to induce a negative pressure in the processing drum relative to an ambient pressure outside the processing drum.

49. The machine of claim 48 further comprising an ioniser to generate an air stream rich in ionised oxygen from ambient air, wherein the air forced through the heater by the first fan is the air stream rich in ionised oxygen.

50. The machine of claim 48 or claim 49, wherein the negative pressure is at least 0.01 mbar.

51. A method of operation of a waste processing machine, comprising:

operating a processing drum of the waste processing machine;

drawing in ambient air through an ioniser to generate a source of air that is rich in ionised oxygen and supplying the source of air that is rich in ionised oxygen into the processing drum;

determining that processed waste residue is to be offloaded from the processing drum;

controlling the ioniser to cease generating the source of air that is rich in ionised oxygen;

diverting ambient air from the ioniser to an air knife adjacent an outlet of the processing drum to assist in offloading waste residue though the outlet.

52. The method of claim 51, wherein the air knife is disposed in a hatch at the outlet of the processing drum.

53. The method of claim 52, further comprising opening the hatch and transferring waste residue from the processing drum through the hatch into a waste bin disposed below the hatch.

54. The method of any one of claims 51 to 53, wherein the determining comprises determining a time of peak power draw of a motor driving rotation of a mixing shaft within the processing drum, and determining that a predetermined time period has elapsed since the time of peak power draw.

55. The method of claim 54, wherein the predetermined time period is a selected period in the range of about 4 to 12 hours.

56. The method of claim 55, wherein the selected period is in the range of about 4 to 7 hours.

~~57. A waste processing drum, comprising:~~

~~a cylindrical wall and first and second opposed end walls to define a substantially closed cylindrical processing chamber except for a waste ingress opening, at least one laterally extending air inlet aperture positioned lower than the waste ingress opening and at least one laterally extending air inlet aperture positioned lower than the waste ingress opening and at least one laterally extending air exhaust aperture positioned higher than the waste ingress opening.~~

~~58. The drum of claim 57, wherein the at least one exhaust aperture comprises multiple exhaust apertures that span a length of between 60-95% of the lateral length of the drum.~~

~~59. The drum of claim 57 or claim 58, wherein the at least one air inlet aperture comprises multiple air inlet apertures that span a length of between 50-80% or 60-90% of the lateral length of the drum.~~

~~60. An organic waste processing machine comprising the waste processing drum of any one of claims 57 to 59.~~

~~61. The steps, processes, sub-processes, components, sub-components, structures, substructures, systems, sub-systems, features, functions, machinery, assemblies, sub-assemblies, arrangements, configurations as described herein and a combination of any two or more of such steps, processes, sub-processes, components, sub-components, structures, substructures, systems, sub-systems, features, functions, machinery, assemblies, sub-assemblies, arrangements, configurations.~~