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(71) Applicant: **MICROBIAL DISCOVERY GROUP, LLC** [US/US]; 5200 W. Ashland Way, Franklin, Wisconsin 53132 (US).

(72) Inventors: **SON, Sona**; 3053 W. Drexel Ave., Unit 118, Franklin, Wisconsin 53132 (US). **KING, Michael R.**; 131 W. Summerhill Place, Oak Creek, Wisconsin 53154 (US). **EDWARD, Jessica**; 6905 67th Street, Unit 111, Kenosha, Wisconsin 53142 (US).

(74) Agent: **BREEN, John P.**; BARNES & THORNBURG LLP, 11 South Meridian Street, Indianapolis, Indiana 46204 (US).

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(54) Title: MICROBIALS FOR BACTERIAL INHIBITION

Escherichia coli	CM256	CM857	CM978	CM1004	MDG1607
Field Isolate 1	+	+	+	+	+
Field Isolate 2	+	+/-	+	+/-	+
Field Isolate 3	+	+/-	+	+/-	+
Field Isolate 4	+	+/-	+	+	+
Field Isolate 5	+	+/-	+	+	+
Field Isolate 6	+/-	+/-	+	+	+
Field Isolate 7	+	+/-	+/-	+/-	+
Field Isolate 8	+	+/-	+	+	+
Field Isolate 9	+	+	+	+/-	+
Field Isolate 10	+	+	+	+	+
Field Isolate 11	+	+	+	+	+
Field Isolate 12	+/-	+	+	+	+
Field Isolate 13	+/-	+	+	+	+
Field Isolate 14	+	+/-	+/-	+/-	+
Field Isolate 15	+	+/-	+/-	+	+
Field Isolate 16	+	+/-	+	+	+
Field Isolate 17	+	+/-	+	+	+
Field Isolate 18	+	+/-	+	+	+
Field Isolate 19	+	+/-	+	+/-	+
Field Isolate 20	+/-	+/-	+	+/-	+
Field Isolate 21	+/-	+/-	+	+/-	+
Field Isolate 22	+/-	+/-	+	+	+
Field Isolate 23	+/-	+/-	+	+	+
Field Isolate 24	+	+	+/-	+/-	+
Field Isolate 25	+	+/-	+	+/-	+
Field Isolate 26	+	+/-	+	+/-	+
Field Isolate 27	+	+/-	+	+/-	+
Field Isolate 28	+	+/-	+	+/-	+
Field Isolate 29	+	+/-	+	+/-	+
Field Isolate 30	+	+	+	+/-	+
Field Isolate 31	+	+/-	+	+	+
Field Isolate 32	+	+/-	+/-	+	+

Fig. 1A

(57) Abstract: The invention relates to direct-fed microbials for use in *E. coli, Salmonella,* and/or *Clostridium* inhibition in animals. More particularly, the invention relates to isolated *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666), and strains having all of the identifying characteristics of these strains, for a use comprising the above-mentioned use. The invention also relates to the use of isolated *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), and strains having all of the identifying characteristics of these strains, to treat plants having diseases caused by *E. coli, Salmonella,* and/or *Clostridium*.

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MICROBIALS FOR BACTERIAL INHIBITION

CROSS-REFERENCE TO RELATED APPLICATIONS

[0001] This application claims the benefit under 35 USC § 119(e) of U.S. Provisional Application Serial No. 63/506,993, filed on June 8, 2023, the entire disclosure of which is incorporated herein by reference.

FIELD OF THE DISCLOSURE

[0002] The invention relates to direct-fed microbials for use in *E. coli, Salmonella,* and/or *Clostridium* inhibition in animals. More particularly, the invention relates to isolated *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666), and strains having all of the identifying characteristics of these strains, for a use comprising the above-mentioned use. The invention also relates to the use of isolated *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), and strains having all of the identifying characteristics of these strains, to treat plants having diseases caused by *E. coli, Salmonella,* and/or *Clostridium.*

BACKGROUND AND SUMMARY OF THE INVENTION

[0003] The present invention relates to direct-fed microbial (DFM) compositions and methods for *E. coli, Salmonella,* and/or *Clostridium* inhibition in an animal. An animal's gastrointestinal tract is constantly challenged by large numbers of bacteria, viruses, fungi, and protozoa found in feed, bedding, and the environment. The gastrointestinal tract has a sophisticated system to counter these potential pathogens consisting of physical, chemical, and immunological lines of defense. Beneficial bacteria are an important part of this system because they provide animals with bacteria that assist in establishment (or reestablishment) of a normal bacterial profile, they strengthen the animal's immune system, and they help to fight disease (e.g., disease caused by *E. coli, Salmonella,* and/or *Clostridium* in animals). Due to the importance of preventing and treating *E. coli, Salmonella,* and/or *Clostridium* disease in animals, both to the agricultural industry, and to the human food supply, direct-fed microbial strains are needed that inhibit *E. coli, Salmonella,* and/or *Clostridium* in animals, such as agricultural animals.

[0004] Applicants have developed direct-fed microbials that result in *E. coli, Salmonella,* and/or *Clostridium* inhibition. The direct-fed microbials and compositions comprising the direct-fed microbials described herein offer a commercial benefit by providing

E. coli, Salmonella, and/or *Clostridium* inhibition in animals, such as agricultural animals. In addition, the direct-fed microbial compositions described herein result in a reduction or elimination in the use of antibiotics which reduces the overall cost of animal feed and reduces the development of antibiotic resistance. Furthermore, these microbial strains, and strains having all of the identifying characteristics of these strains, can be used to treat plants having diseases caused by *E. coli, Salmonella,* and/or *Clostridium.*

[0005] Methods and compositions are provided for inhibiting *E. coli, Salmonella,* and/or *Clostridium* in animals. In various embodiments, the animal can be selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal. In the embodiment where the animal is a poultry species, the poultry species can be selected from the group consisting of a broiler, a chicken, a layer, a breeder, a turkey, a turkey poult, a gosling, a duckling, a guineakeet, a pullet, a hen, a rooster, a cockerel, and a capon. In the embodiment where the animal is a porcine species, the porcine species can be selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[0006] In one embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

[0007] In another embodiment, a method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all

of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

[0008] In yet another embodiment, a commercial package is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0009] In still another embodiment, a feed additive for an animal feed is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0010] In another illustrative embodiment, an additive for the drinking water of an animal is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978

(NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0011] In another aspect, an animal feed composition is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0012] In yet another embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

[0013] In another illustrative aspect, a method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having

all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

[0014] The following clauses, and combinations thereof, provide various additional illustrative aspects of the invention described herein. The various embodiments described in any other section of this patent application, including the section titled "DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS" and the EXAMPLES are applicable to any of the following embodiments of the invention described in the numbered clauses below.

[0015] 1. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

[0016] 2. The method of clause 1 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium.*

[0017] 3. The method of clause 1 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[0018] 4. The method of clause 3 wherein the poultry species is a broiler chicken.

[0019] 5. The method of any one of clauses 1 to 4 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[0020] 6. The method of any one of clauses 1 to 4 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[0021] 7. The method of clause 3 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[0022] 8. The method of any one of clauses 1 to 7 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[0023] 9. The method of any one of clauses 1 to 8 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[0024] 10. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[0025] 11. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[0026] 12. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[0027] 13. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[0028] 14. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[0029] 15. The method of any one of clauses 1 to 9 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[0030] 16. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

[0031] 17. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

[0032] 18. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

[0033] 19. The method of any one of clauses 1 to 18 further comprising the step of administering an antibiotic to the animal.

[0034] 20. The method of any one of clauses 1 to 19 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[0035] 21. The method of clause 20 wherein the enzyme is an NSPase or a phytase.

[0036] 22. The method of clause 3 wherein the animal is a companion animal.

[0037] 23. The method of clause 22 wherein the animal is a canine species or a feline species.

[0038] 24. The method of clause 3 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[0039] 25. The method of clause 3 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[0040] 26. The method of any one of clauses 1 to 25 wherein the feed composition is administered daily to the animal.

[0041] 27. The method of clause 1 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[0042] 28. A method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, the method comprising the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

[0043] 29. The method of clause 28 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium.*

[0044] 30. The method of clause 28 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[0045] 31. The method of clause 30 wherein the poultry species is a broiler chicken.

[0046] 32. The method of any one of clauses 28 to 31 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[0047] 33. The method of any one of clauses 28 to 31 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[0048] 34. The method of clause 30 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[0049] 35. The method of any one of clauses 28 to 34 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[0050] 36. The method of any one of clauses 28 to 35 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[0051] 37. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[0052] 38. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[0053] 39. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[0054] 40. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[0055] 41. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[0056] 42. The method of any one of clauses 28 to 36 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[0057] 43. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

[0058] 44. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

[0059] 45. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

[0060] 46. The method of any one of clauses 28 to 45 further comprising the step of administering an antibiotic to the animal.

[0061] 47. The method of any one of clauses 28 to 46 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[0062] 48. The method of clause 47 wherein the enzyme is an NSPase or a phytase.

[0063] 49. The method of clause 30 wherein the animal is a companion animal.

[0064] 50. The method of clause 49 wherein the animal is a canine species or a feline species.

[0065] 51. The method of clause 30 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[0066] 52. The method of clause 30 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[0067] 53. The method of any one of clauses 28 to 50 wherein the feed composition is administered daily to the animal.

[0068] 54. The method of clause 28 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[0069] 55. A commercial package comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0070] 56. A feed additive for an animal feed comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of

Bacillus strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0071] 57. An additive for the drinking water of an animal comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0072] 58. An animal feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[0073] 59. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 55 to 58 wherein the *Bacillus* strain causes an effect selected from the group consisting of preventing *E. coli, Salmonella,* and/or *Clostridium* disease, reducing *E. coli, Salmonella,* and/or *Clostridium* disease, maintaining the microbial balance of the animal, and combinations thereof.

[0074] 60. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 55 to 59, wherein the *Bacillus* strain reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[0075] 61. The feed additive or additive for the drinking water of the animal of clause 56 or 57 in the form of a concentrate.

[0076] 62. The feed additive or additive for the drinking water of the animal of clause 56 or 57 in the form of a superconcentrate.

[0077] 63. The feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 56 to 62 in dry form.

[0078] 64. The feed composition of clause 63 in pelleted form.

[0079] 65. The commercial package of clause 55 wherein the strains are in a form selected from the group consisting of a powder, a liquid, and a pellet form.

[0080] 66. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 65 further comprising a carrier for the *Bacillus* strains.

[0081] 67. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 66 wherein the carrier is selected from the group consisting of a bran, rice hulls, a salt, a dextrin, and combinations thereof.

[0082] 68. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 67 in a bag.

[0083] 69. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 68 wherein the bag is a plastic bag.

[0084] 70. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 69 further comprising instructions for use of one or more of the *Bacillus* strains.

[0085] 71. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 68 to 70 in a 20-pound bag.

[0086] 72. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 68 to 70 in a 50-pound bag.

[0087] 73. The feed additive or additive for the drinking water of the animal of any one of clauses 56, 57, 59 to 63, or 66 to 72 in powder form.

[0088] 74. The feed additive or additive for the drinking water of the animal of any one of clauses 56, 57, 59 to 60, or 68 to 70 in liquid form.

[0089] 75. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 74 in a container for commercial use.

[0090] 76. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 75 wherein the container comprises plastic.

[0091] 77. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 75 wherein the container comprises paper.

[0092] 78. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 77 further comprising a binder.

[0093] 79. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 78 wherein the binder is selected from the group consisting of clay, yeast cell wall components, aluminum silicate, and glucan, or combinations thereof.

[0094] 80. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 79 comprising isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

[0095] 81. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 79 comprising all of isolated *Bacillus* strains MDG1607 (NRRL No. B-67666), CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708).

[0096] 82. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain

CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

[0097] 83. The method of clause 82 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

[0098] 84. The method of clause 82 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[0099] 85. The method of clause 84 wherein the poultry species is a broiler chicken.

[00100] 86. The method of any one of clauses 82 to 85 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00101] 87. The method of any one of clauses 82 to 85 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00102] 88. The method of clause 84 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[00103] 89. The method of any one of clauses 82 to 88 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[00104] 90. The method of any one of clauses 82 to 89 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[00105] 91. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[00106] 92. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[00107] 93. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[00108] 94. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00109] 95. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00110] 96. The method of any one of clauses 82 to 90 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[00111] 97. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 5.0 x 10^{12} CFU/gram of the feed composition.

[00112] 98. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 1.0 x 10^7 CFU/gram of the feed composition.

[00113] 99. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0 x 10^4 CFU/gram of the feed composition.

[00114] 100. The method of any one of clauses 82 to 99 further comprising the step of administering an antibiotic to the animal.

[00115] 101. The method of any one of clauses 82 to 99 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[00116] 102. The method of clause 101 wherein the enzyme is an NSPase or a phytase.

[00117] 103. The method of clause 84 wherein the animal is a companion animal.

[00118] 104. The method of clause 103 wherein the animal is a canine species or a feline species.

[00119] 105. The method of clause 84 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[00120] 106. The method of clause 84 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[00121] 107. The method of any one of clauses 82 to 104 wherein the feed composition is administered daily to the animal.

[00122] 108. The method of clause 82 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[00123] 109. A method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium*, the method comprising contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the

group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

[00124] 110. The method of clause 109 wherein the plant has a disease caused by *E. coli, Salmonella,* and/or *Clostridium.*

[00125] 111. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM256 (NRRL No. B-67706).

[00126] 112. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM857 (NRRL No. B-67705).

[00127] 113. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM978 (NRRL No. B-67703).

[00128] 114. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00129] 115. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00130] 116. The method of clause 109 or 110 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all used to treat the plant.

[00131] 117. The method of clause 109 or 110 wherein isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), is used to treat the plant in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

BRIEF DESCRIPTION OF THE DRAWINGS

FIGS. 1A-1C show the results of whole cell preparations of *Bacillus* strains CM256, CM857, CM978, CM1004, and MDG1607 for efficacy against various bacterial isolates. Fig. 1A shows the results of whole cell preparations of *Bacillus* strains CM256, CM857, CM978, CM1004, and MDG1607 for efficacy against various isolates of *E. coli*. FIG. 1B show the results of whole cell preparation of *Bacillus* strains CM256, CM857, CM978, CM1004, and MDG1607 for efficacy against various isolates of *Clostridium*. FIG. 1C shows the results of whole cell preparation of *Bacillus* strains CM256, CM857, CM978, CM1004, and MDG1607 for efficacy against various isolates of *Salmonella*.

FIGS. 2A-2E show the RAPD testing results for *Bacillus* strains of the present disclosure. FIG. 2A shows the RAPD testing results for *Bacillus* strain CM256. FIG. 2B shows the RAPD testing results for *Bacillus* strain CM857. FIG. 2C shows the RAPD testing results for *Bacillus* strain CM978. FIG. 2D shows the RAPD testing results for *Bacillus* strain CM1004. FIG. 2E shows the RAPD testing results for *Bacillus* strain MDG1607.

FIG. 3 shows the results of whole cell preparations of *Bacillus* strains CM256, CM857, CM978, CM1004, and MDG1607 for enzymatic activity of lipase, amylase, protease, xylanase, and cellulase.

DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS

[00132] Methods and compositions are provided for inhibiting *E. coli, Salmonella,* and/or *Clostridium* in animals. In various embodiments, the animal can be selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal. In the embodiment where the animal is a poultry species, the poultry species can be selected from the group consisting of a broiler, a chicken, a layer, a breeder, a turkey, a turkey poult, a gosling, a duckling, a guineakeet, a pullet, a hen, a rooster, a cockerel, and a capon. In the embodiment where the animal is a porcine species, the porcine species can be selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[00133] In one embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water

comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

[00134] In another embodiment, a method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal. In one embodiment, a method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* is provided wherein the method comprises the steps of administering to an animal a feed composition or drinking water that comprises an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), or any combination thereof.

[00135] In yet another embodiment, a commercial package is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL

No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00136] In still another embodiment, a feed additive for an animal feed is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof. In one embodiment, a feed additive for an animal feed is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), or any combination thereof.

[00137] In another illustrative embodiment, an additive for the drinking water of an animal is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof. In one embodiment, an additive for the drinking water of an animal is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), or any combination thereof.

[00138] In another aspect, an animal feed composition is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-

67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof. In one embodiment, an animal feed composition is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708), or any combination thereof.

[00139] In yet another embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

[00140] In another illustrative aspect, a method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

[00141] The following clauses, and combinations thereof, provide various additional illustrative aspects of the invention described herein. The various embodiments described in this section titled "DETAILED DESCRIPTION OF ILLUSTRATIVE EMBODIMENTS" are applicable to any of the following embodiments of the invention described in the numbered clauses below.

[00142] 1. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

[00143] 2. The method of clause 1 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium.*

[00144] 3. The method of clause 1 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[00145] 4. The method of clause 3 wherein the poultry species is a broiler chicken.

[00146] 5. The method of any one of clauses 1 to 4 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00147] 6. The method of any one of clauses 1 to 4 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00148] 7. The method of clause 3 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[00149] 8. The method of any one of clauses 1 to 7 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[00150] 9. The method of any one of clauses 1 to 8 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[00151] 10. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[00152] 11. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[00153] 12. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[00154] 13. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00155] 14. The method of any one of clauses 1 to 9 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00156] 15. The method of any one of clauses 1 to 9 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[00157] 16. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

[00158] 17. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

[00159] 18. The method of any one of clauses 1 to 15 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

[00160] 19. The method of any one of clauses 1 to 18 further comprising the step of administering an antibiotic to the animal.

[00161] 20. The method of any one of clauses 1 to 19 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[00162] 21. The method of clause 20 wherein the enzyme is an NSPase or a phytase.

[00163] 22. The method of clause 3 wherein the animal is a companion animal.

[00164] 23. The method of clause 22 wherein the animal is a canine species or a feline species.

[00165] 24. The method of clause 3 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[00166] 25. The method of clause 3 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[00167] 26. The method of any one of clauses 1 to 25 wherein the feed composition is administered daily to the animal.

[00168] 27. The method of clause 1 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[00169] 28. A method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, the method comprising the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

[00170] 29. The method of clause 28 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

[00171] 30. The method of clause 28 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[00172] 31. The method of clause 30 wherein the poultry species is a broiler chicken.

[00173] 32. The method of any one of clauses 28 to 31 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00174] 33. The method of any one of clauses 28 to 31 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00175] 34. The method of clause 30 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[00176] 35. The method of any one of clauses 28 to 34 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[00177] 36. The method of any one of clauses 28 to 35 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[00178] 37. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[00179] 38. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[00180] 39. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[00181] 40. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00182] 41. The method of any one of clauses 28 to 36 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00183] 42. The method of any one of clauses 28 to 36 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[00184] 43. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

[00185] 44. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

[00186] 45. The method of any one of clauses 28 to 42 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

[00187] 46. The method of any one of clauses 28 to 45 further comprising the step of administering an antibiotic to the animal.

[00188] 47. The method of any one of clauses 28 to 46 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[00189] 48. The method of clause 47 wherein the enzyme is an NSPase or a phytase.

[00190] 49. The method of clause 30 wherein the animal is a companion animal.

[00191] 50. The method of clause 49 wherein the animal is a canine species or a feline species.

[00192] 51. The method of clause 30 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[00193] 52. The method of clause 30 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[00194] 53. The method of any one of clauses 28 to 50 wherein the feed composition is administered daily to the animal.

[00195] 54. The method of clause 28 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[00196] 55. A commercial package comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00197] 56. A feed additive for an animal feed comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of

Bacillus strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00198] 57. An additive for the drinking water of an animal comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00199] 58. An animal feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00200] 59. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 55 to 58 wherein the *Bacillus* strain causes an effect selected from the group consisting of preventing *E. coli, Salmonella,* and/or *Clostridium* disease, reducing *E. coli, Salmonella,* and/or *Clostridium* disease, maintaining the microbial balance of the animal, and combinations thereof.

[00201] 60. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 55 to 59, wherein the *Bacillus* strain reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00202] 61. The feed additive or additive for the drinking water of the animal of clause 56 or 57 in the form of a concentrate.

[00203] 62. The feed additive or additive for the drinking water of the animal of clause 56 or 57 in the form of a superconcentrate.

[00204] 63. The feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 56 to 62 in dry form.

[00205] 64. The feed composition of clause 63 in pelleted form.

[00206] 65. The commercial package of clause 55 wherein the strains are in a form selected from the group consisting of a powder, a liquid, and a pellet form.

[00207] 66. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 65 further comprising a carrier for the *Bacillus* strains.

[00208] 67. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 66 wherein the carrier is selected from the group consisting of a bran, rice hulls, a salt, a dextrin, and combinations thereof.

[00209] 68. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 67 in a bag.

[00210] 69. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 68 wherein the bag is a plastic bag.

[00211] 70. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 69 further comprising instructions for use of one or more of the *Bacillus* strains.

[00212] 71. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 68 to 70 in a 20-pound bag.

[00213] 72. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of clauses 68 to 70 in a 50-pound bag.

[00214] 73. The feed additive or additive for the drinking water of the animal of any one of clauses 56, 57, 59 to 63, or 66 to 72 in powder form.

[00215] 74. The feed additive or additive for the drinking water of the animal of any one of clauses 56, 57, 59 to 60, or 68 to 70 in liquid form.

[00216] 75. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 74 in a container for commercial use.

[00217] 76. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 75 wherein the container comprises plastic.

[00218] 77. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 75 wherein the container comprises paper.

[00219] 78. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 77 further comprising a binder.

[00220] 79. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of clause 78 wherein the binder is selected from the group consisting of clay, yeast cell wall components, aluminum silicate, and glucan, or combinations thereof.

[00221] 80. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 79 comprising isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

[00222] 81. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of clauses 55 to 79 comprising all of isolated *Bacillus* strains MDG1607 (NRRL No. B-67666), CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708).

[00223] 82. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain

CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

[00224] 83. The method of clause 82 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

[00225] 84. The method of clause 82 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

[00226] 85. The method of clause 84 wherein the poultry species is a broiler chicken.

[00227] 86. The method of any one of clauses 82 to 85 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00228] 87. The method of any one of clauses 82 to 85 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

[00229] 88. The method of clause 84 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

[00230] 89. The method of any one of clauses 82 to 88 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

[00231] 90. The method of any one of clauses 82 to 89 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

[00232] 91. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

[00233] 92. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

[00234] 93. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

[00235] 94. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00236] 95. The method of any one of clauses 82 to 90 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00237] 96. The method of any one of clauses 82 to 90 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

[00238] 97. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 5.0 x 10^{12} CFU/gram of the feed composition.

[00239] 98. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 1.0 x 10^7 CFU/gram of the feed composition.

[00240] 99. The method of any one of clauses 82 to 96 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0 x 10^4 CFU/gram of the feed composition.

[00241] 100. The method of any one of clauses 82 to 99 further comprising the step of administering an antibiotic to the animal.

[00242] 101. The method of any one of clauses 82 to 99 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

[00243] 102. The method of clause 101 wherein the enzyme is an NSPase or a phytase.

[00244] 103. The method of clause 84 wherein the animal is a companion animal.

[00245] 104. The method of clause 103 wherein the animal is a canine species or a feline species.

[00246] 105. The method of clause 84 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

[00247] 106. The method of clause 84 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

[00248] 107. The method of any one of clauses 82 to 104 wherein the feed composition is administered daily to the animal.

[00249] 108. The method of clause 82 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

[00250] 109. A method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium*, the method comprising contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the

group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

[00251] 110. The method of clause 109 wherein the plant has a disease caused by *E. coli, Salmonella,* and/or *Clostridium.*

[00252] 111. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM256 (NRRL No. B-67706).

[00253] 112. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM857 (NRRL No. B-67705).

[00254] 113. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM978 (NRRL No. B-67703).

[00255] 114. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain CM1004 (NRRL No. B-67708).

[00256] 115. The method of clause 109 or 110 wherein the strain used is *Bacillus* strain MDG1607 (NRRL No. B-67666).

[00257] 116. The method of clause 109 or 110 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all used to treat the plant.

[00258] 117. The method of clause 109 or 110 wherein isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), is used to treat the plant in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

[00259] In various embodiments, the animal to which a feed additive, a feed composition, or drinking water as described herein is administered can be selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal. In the embodiment where the animal is a companion animal, the companion animal can be, for example, a canine species or a feline species. In the embodiment where the animal is a porcine species, the porcine species can be selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig. In various exemplary embodiments, the animal can be selected from the group consisting of a chicken (e.g., a broiler or a layer), a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish (e.g., a tilapia, a catfish, a flounder, or a salmon), a crustacean (e.g., a shrimp or a crab), and combinations thereof. In another embodiment, the feed additive, feed composition, or drinking water as described herein could be administered to a human.

[00260] In another embodiment, isolated *Bacillus* strains selected from the group consisting of CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, can reduce contamination by detrimental *E. coli, Salmonella,* and/or *Clostridium* in meat products produced from the animal, or can be used in food processing to reduce detrimental effects of *E. coli, Salmonella,* and/or *Clostridium* in foods.

[00261] In various embodiments of the method, commercial package, feed additive, feed composition, or additive for drinking water described herein, the *Bacillus* strain can have an effect selected from the group consisting of maintaining microbial balance in the gut of the animal, preventing or reducing *E. coli, Salmonella,* and/or *Clostridium* disease in the animal, improving animal performance or health, maintaining gut health in the animal, reducing detrimental pathogens in the gut of the animal, odor reduction, reducing detrimental pathogens in the urine or feces of the animal, and preserving the growth of beneficial bacteria in the gut of the animal.

[00262] In any of the embodiments, described herein the *Bacillus* strain can be a *Bacillus subtilis* strain (e.g., strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708)), or a *Bacillus amyloliquefaciens* strain (e.g., strain MDG1607).

[00263] In any embodiments described herein, the *Bacillus* strains can be administered alone or in any combination, or can be in the form of any composition described herein so that the strains are alone or in any combination in the compositions described herein. The *Bacillus* strains described herein can also be used in combination with other microbial strains, including other *Bacillus* strains or *Lactobacillus* strains. Exemplary combinations include all of strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) used together in combination. Another exemplary combination includes *Bacillus* strain MDG1607 (NRRL No. B-67666) in combination with one of more of *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and/or CM1004 (NRRL No. B-67708). Another embodiment is one or more of *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) in any combination.

[00264] In one embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

[00265] In another embodiment, a method of feeding an animal is provided. The method comprises the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256

(NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

[00266] In one embodiment of the invention, an effective amount of the *Bacillus* strain can be administered to inhibit *E. coli, Salmonella,* and/or *Clostridium* in the animal. As used herein, "inhibit *E. coli, Salmonella,* and/or *Clostridium*" can mean reducing *E. coli, Salmonella,* and/or *Clostridium* disease, preventing *E. coli, Salmonella,* and/or *Clostridium* disease, maintaining the normal microbial balance in the animal, reducing the number of detrimental *E. coli, Salmonella,* and/or *Clostridium* in the animal, reducing the activity of *E. coli, Salmonella,* and/or *Clostridium* in the animal, or reducing the symptoms of *E. coli, Salmonella,* and/or *Clostridium* disease in the animal, or combinations thereof. By "effective amount" is meant an amount of the *Bacillus* strain (e.g., strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and/or MDG1607 (NRRL No. B-67666)) capable of *E. coli, Salmonella,* and/or *Clostridium* inhibition or capable of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, as described below, by any mechanism. In one illustrative embodiment, the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

[00267] In still another embodiment, a method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

[00268] In embodiments described herein wherein the compositions of the present invention comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, are administered to an animal, the compositions are preferably administered to animals orally in a feed composition or in drinking water, but any other effective method of administration known to those skilled in the art may be utilized such as in a paste, a liquid drench, a top dress, or a capsule. In one illustrative embodiment, an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, are provided in the form of an additive for addition to the drinking water of an animal. In another embodiment, the strains may be used as a litter treatment to control detrimental effects of *E. coli, Salmonella*, and/or *Clostridium*.

[00269] In another illustrative embodiment, an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, are provided in the form of a feed additive for addition to a feed composition. The feed composition may contain

an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, in a mixture with an animal feed blend, including any art-recognized animal feed blend or any animal feed blend described herein. As used herein, "feed composition" or "animal feed composition" means a feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, in a mixture with an animal feed blend, and, optionally any other components that could be used in a feed composition, including other bacterial strains, such as other *Bacillus* strains or *Lactobacillus* strains. In one embodiment, the feed composition may be in the form of a ground meal.

[00270] Any animal feed blend, including those known in the art and those described herein, may be used in accordance with the methods and compositions described in this patent application, such as rapeseed meal, cottonseed meal, soybean meal, cornmeal, barley, wheat, silage, and haylage. In various embodiments, the animal feed blend can be supplemented with an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain

having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, but other ingredients may optionally be added to the animal feed blend, including other bacterial strains, such as other *Bacillus* strains or *Lactobacillus* strains.

[00271] In various illustrative embodiments, optional ingredients of the animal feed blend include sugars and complex carbohydrates such as both water-soluble and water-insoluble monosaccharides, disaccharides, and polysaccharides. Other optional ingredients include dried distillers grain solubles, fat (e.g., crude fat), phosphorous, sodium bicarbonate, limestone, salt, phytate, calcium, sodium, sulfur, magnesium, potassium, copper, iron, manganese, zinc, ash, fish oil, an oil derived from fish meal, raw seed (e.g., flaxseed), an antioxidant, and starch. In another embodiment, minerals may be added in the form of a mineral premix.

[00272] Optional amino acid ingredients that may be added to the animal feed blend are arginine, histidine, isoleucine, leucine, lysine, cysteine, methionine, phenylalanine, threonine, tryptophan, valine, tyrosine ethyl HCl, alanine, aspartic acid, sodium glutamate, glycine, proline, serine, cysteine ethyl HCl, and analogs, and salts thereof. Vitamins that may be optionally added are thiamine HCl, riboflavin, pyridoxine HCl, niacin, niacinamide, inositol, choline chloride, calcium pantothenate, biotin, folic acid, ascorbic acid, and vitamins A, B, K, D, E, and the like. In another embodiment, vitamins may be added in the form of a vitamin premix. In yet another embodiment, protein ingredients may be added to the animal feed blend and include protein obtained from meat meal, bone meal, or fish meal, liquid or powdered egg, fish solubles, crude protein, and the like.

[00273] In another illustrative aspect, any medicament ingredients known in the art may be added to the animal feed blend or to an additive for the drinking water of the animal, such as antibiotics. In various embodiments, the antibiotic is selected from the group consisting of ampicillin, chloramphenicol, ciprofloxacin, clindamycin, tetracycline, chlortetracycline, Denagard™ (i.e., tiamulin), BMD™ (i.e., bacitracin methylene disalicylate), Carbadox™ (i.e., carbadox), Stafac™ (i.e., virginiamycin), erythromycin, levofloxacin, trimethoprim/ sulfamethoxazole, trimethoprim, daptomycin, rifampicin, Tylan™ (i.e., tylosin), Pulmotil™ (i.e., tilmicosin), vancomycin, and combinations thereof. In another embodiment, the animal feed blend, the feed composition, the feed additive, or the additive for the drinking water of the animal may contain no antibiotics.

[00274] In another illustrative embodiment, one or more enzymes may be added to the animal feed blend. In various embodiments, the enzymes that may be added include a galactosidase, a phytase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, combinations thereof, and any other enzyme that improves the

effectiveness of the feed composition for *E. coli, Clostridium,* and/or *Salmonella* inhibition or controlling a detrimental effect of *E. coli, Clostridium,* and/or *Salmonella*. In yet another embodiment, yeast, fungi (e.g., *Aspergillus* or *Trichoderma*), or micronutrients may be added to the animal feed. Any of the ingredients described above that are suitable for addition to an additive for the drinking water of the animal may be added as a component of the additive for the drinking water of the animal as described herein.

[00275] In various illustrative embodiments, an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, can be administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition or at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition. In other embodiments, the *Bacillus* strain is administered in the feed composition at a dose greater than about 1.0×10^3 CFU/gram of the feed composition, at a dose greater than about 1.1×10^3 CFU/gram of the feed composition, at a dose greater than about 1.25×10^3 CFU/gram of the feed composition, at a dose greater than about 1.5×10^3 CFU/gram of the feed composition, at a dose greater than about 1.75×10^3 CFU/gram of the feed composition, at a dose greater than about 1.0×10^4 CFU/gram of the feed composition, at a dose greater than about 2.0×10^4 CFU/gram of the feed composition, at a dose greater than about 3.0×10^4 CFU/gram of the feed composition, at a dose greater than about 4.0×10^4 CFU/gram of the feed composition, at a dose greater than about 5.0×10^4 CFU/gram of the feed composition, at a dose greater than about 6.0×10^4 CFU/gram of the feed composition, at a dose greater than about 7.0×10^4 CFU/gram of the feed composition, at a dose greater than about 8.0×10^4 CFU/gram of the feed composition, at a dose greater than about 1.0×10^5 CFU/gram of the feed composition, at a dose greater than about 1.0×10^6 CFU/gram of the feed composition, at a dose greater than about 1.0×10^7 CFU/gram of the feed composition, at a dose greater than about 1.0×10^8 CFU/gram of the feed composition, at a dose greater than about 1.0×10^9 CFU/gram of the feed composition, at a dose greater than about 1.0×10^{10} CFU/gram of the feed composition, at a dose greater than about

1.0 x 10^{11} CFU/gram of the feed composition, or at a dose greater than about 1.0 x 10^{12} CFU/gram of the feed composition. In yet another embodiment, the *Bacillus* strain is administered in the feed composition at a dose of about 7.3 x 10^{4} CFU/gram of the feed composition. In another embodiment, an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, or any other bacterial strains added in addition to these *Bacillus* strains, can be administered in the feed composition at a dose of about 1.0 x 10^{2} CFU/gram of the feed composition to about 5.0 x 10^{12} CFU/gram of the feed composition or at a dose of about 1.0 x 10^{2} CFU/gram of the feed composition to about 1.0 x 10^{7} CFU/gram of the feed composition, or at a dose greater than about 1.0 x 10^{2} CFU/gram of the feed composition. In another embodiment, any of the dosages described herein can be in CFU/ml of drinking water in embodiments where the strains are administered in the drinking water of the animal.

[00276] In various embodiments, the isolated *Bacillus* strains described herein are selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof. *Bacillus* strains CM256, CM857, CM978, and CM1004 were deposited on November 29, 2018 at the Agricultural Research Service Culture Collection (NRRL), National Center for Agricultural Utilization Research, Agricultural Research Service, USDA, 1815 North University Street, Peoria, Illinois 61604-3999, and were given accession numbers B-67706, B-67705, B-67703, and B-67708, respectively. The deposits were made under the provisions of the Budapest Treaty on the International Recognition of the Deposit of

Microorganisms for the Purposes of Patent Procedure. The NRRL strain designations are B-67706, B-67705, B-67703, and B-67708, which are equivalent to *Bacillus* strain CM256, CM857, CM978, and CM1004, respectively, as referred to in the application. *Bacillus* strain MDG1607 (NRRL No. B-67666) was deposited on August 14, 2018 at the Agricultural Research Service Culture Collection (NRRL), International Depository Authority, 1815 North University Street, Peoria, Illinois 61604, and was given accession number B-67666. The deposit was made under the provisions of the Budapest Treaty on the International Recognition of the Deposit of Microorganisms for the Purposes of Patent Procedure. The NRRL strain designation is MDG1607, which is equivalent to *Bacillus* strain MDG1607 or strain 1607, as referred to in the application. Any of these strains can be administered alone or in combination in the form of a feed composition (e.g., a complete feed comprising an animal feed blend) or drinking water for an animal. In one embodiment, multiple strains are administered in combination in a single composition. In another embodiment, multiple strains are administered in combination in separate compositions.

[00277] In another embodiment, one or more of the *Bacillus* strains, described in the preceding paragraphs, including isolated *Bacillus* strains selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, can be administered to the animal along with another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof. In yet another embodiment, one or more of isolated *Bacillus* strains selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666),

and combinations thereof, can be administered to the animal along with any other bacterial strain effective to inhibit or control detrimental effects of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

[00278] As used herein "a strain having all of the identifying characteristics of" *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666) can be a mutant strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666) (e.g., a DNA fingerprint based on DNA analysis that corresponds to the DNA fingerprint of *Bacillus* strain *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666), enzyme activities that correspond to *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666), antimicrobial activity that corresponds to *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666), antibiotic sensitivity and tolerance profiles that correspond to *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666), or combinations of these identifying characteristics). In alternate embodiments, the mutation can be a natural mutation, or a genetically engineered mutation. In another embodiment, "a strain having all of the identifying characteristics of" *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666) can be a strain, for example, produced by isolating one or more plasmids from *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666) and introducing the one or more plasmids into another bacterium, such as another *Bacillus* strain, as long as the one or more plasmids contain DNA that provides the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666) (e.g., a DNA fingerprint based on DNA analysis that corresponds to the DNA fingerprint of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), or MDG1607 (NRRL No. B-67666)).

[00279] The feed composition or drinking water comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, may be administered to the animal for any time period that is effective to inhibit *E. coli, Salmonella,* and/or *Clostridium* or control a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal, or combinations thereof. For example, in one embodiment the feed composition or drinking water may be provided to the animal daily. In an alternate embodiment, the feed composition or drinking water may be administered to the animal during lactation and/or during gestation. The time periods for administration of the feed composition or drinking water described above are non-limiting examples and it should be appreciated that any time period or administration schedule determined to be effective to inhibit *E. coli, Salmonella,* and/or *Clostridium* or control a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, or combinations thereof, may be used.

[00280] In these embodiments, "controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*" can mean reducing *E. coli, Salmonella,* and/or *Clostridium* disease, preventing *E. coli, Salmonella,* and/or *Clostridium* disease, maintaining the normal microbial balance in the animal, reducing the number of detrimental *E. coli, Salmonella,* and/or *Clostridium* in the animal, reducing the activity of *E. coli, Salmonella,* and/or *Clostridium* in the animal, or reducing the symptoms of *E. coli, Salmonella,* and/or *Clostridium* disease in the animal, or combinations thereof. By "effective amount" is meant an amount of the *Bacillus* strain capable of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, as described above, by any mechanism.

[00281] In additional embodiments of the invention, compositions comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the

identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, are provided.

[00282] In one embodiment, a commercial package is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00283] In another embodiment, a feed additive for an animal feed is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00284] In yet another embodiment, an additive for the drinking water of an animal is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00285] In yet another illustrative aspect of the invention, an animal feed composition is provided comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus*

strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

[00286] In one embodiment, the feed additive for addition to an animal feed blend to produce a complete feed composition can be mixed with the animal feed blend, for example, with an automated micro-nutrient delivery system, or, for example, by hand-weighing and addition to achieve any of the doses of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, described herein, for administration to the animal in the form of a complete feed composition. The mixing can also be done by any other suitable method known in the art for combining direct-fed microbials with an animal feed blend to obtain a uniform mixture. In various embodiments, the mixing can be done for any suitable time period (e.g., about 1 to about 4 minutes). In the embodiment where an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, is in the form of an additive for the drinking water of the animal, the isolated *Bacillus* strain selected

from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, can be in the form of, for example, a powder, a liquid, or pellets, and can be mixed with the drinking water using any suitable method known in the art to achieve any of the doses of the *Bacillus* strains described herein, for administration to the animal in the drinking water of the animal.

[00287] The isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, can also be fed directly to the animal orally (e.g., by oral insertion) in the form of a powder, a liquid, or a pellet.

[00288] In one illustrative aspect, the feed additive, additive for the drinking water of the animal, or the feed composition can be in the form of a commercial package. In another illustrative embodiment, the feed additive or additive for the drinking water of the animal, or the isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, in the commercial package can be in the form of a concentrate (e.g.,

about 1 x 10^8 to about 5 x 10^9 CFU/g) or a superconcentrate (e.g., about 1 x 10^{10} to about 5 x 10^{12} CFU/g). In another embodiment, the feed additive, feed composition, or additive for the drinking water of the animal, or the isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, in a composition in a commercial package, can be in a dry form (e.g., a powder), a pelleted form, a liquid form, in the form of a top-dressing, or in the form of a gel, or any other suitable form.

[00289] In yet another embodiment, the strains in the form of a commercial package can be, for example, in a dry form (e.g., a powder or freeze-dried form), in a pelleted form, or in a liquid form.

[00290] In another illustrative embodiment, the commercial package, feed additive, additive for the drinking water of the animal, or feed composition can further comprise a carrier for the isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof. The carrier can be selected from the group consisting of a bran, rice hulls, a salt, mineral oil, a dextrin (e.g., maltodextrin), whey, sugar, sucrose, limestone, yeast culture, dried starch, sodium silico aluminate, silicon dioxide, polypropylene glycol, polysorbate 80, vegetable oil, and combinations thereof. In another embodiment, the carrier can be any suitable carrier known in the art for a direct-fed microbial. In another embodiment, the commercial package, feed additive, additive for the drinking water of the animal, or feed composition can further comprise a binder such as clay, yeast cell wall components, aluminum silicate, glucan, or other known binders. In another embodiment, the commercial package, feed

additive, additive for the drinking water of the animal, or feed composition can further comprise inorganic/organic binders, essential oils, and/or organic acids.

[00291] In yet other embodiments, the commercial package, feed additive, additive for the drinking water of the animal, or feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, is in a container for commercial use. In various embodiments the container can be, for example, a bag (e.g., a 20-pound bag, a 50-pound bag, a 2-ounce bag, a 1-pound bag, or a 1-kilogram bag), a pouch, a drum, a bottle, or a box. In illustrative aspects, the container for the commercial package, feed additive, additive for the drinking water of the animal, or feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, can comprise plastic, metal, foil, paper, fiber, or cardboard (e.g., a plastic pail, a paper bag, a foil bag, a fiber drum, etc.). The commercial package, feed additive, additive for the drinking water of the animal, or feed composition can further comprise instructions for use of one or more of the *Bacillus* strains.

[00292] In all of the composition embodiments described herein, isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), can be used in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004

(NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

[00293] In another embodiment, a method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium* is provided. The method comprises contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

[00294] In this embodiment, *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) can all used to treat the plant, or any of *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and/or MDG1607 (NRRL No. B-67666) can be used in any combination.

[00295] In yet another embodiment, isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), can be used to treat the plant in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

[00296] In another illustrative embodiment, the supernatants from the culture of any of the isolated *Bacillus* strains described herein selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof, can be used in the same methods and compositions and for the same purpose as described herein for the whole cell preparations of the strains.

[00297] The following examples are for illustrative purposes only. The examples are non-limiting, and are not intended to limit the invention in any way.

EXAMPLE 1
IN VITRO STUDIES OF EFFICACY OF CM256, CM857, CM978, CM1004, AND MDG1607 WHOLE CELL PREPARATIONS AGAINST ANIMAL PATHOGENS

[00298] Strain specific efficacy was tested using agar cross-streak antimicrobial susceptibility methods known in the art and described below. Briefly, CM256, CM857, CM978, CM1004, and MDG 1607 were inoculated from frozen glycerol stocks in a single 1 cm wide horizontal streak down the center of a BHI+ agar plate. *Bacillus* streaked plates were incubated aerobically for 16 hours at 37°C, or until a confluent streak of growth was present. FIG. 1A shows antimicrobial screening utilizing the agar cross-streak method against various isolates of *E. coli*. FIG. 1B shows antimicrobial screening utilizing the agar cross-streak method against various isolates of *Clostridium*. FIG. 1C shows antimicrobial screening utilizing the agar cross-streak method against various isolates of *Salmonella*.

EXAMPLE 2
STRAIN IDENTIFICATION AND UNIQUENESS.

[00299] The Randomly Amplified Polymorphic DNA PCR method (hereafter referred to as RAPD-PCR) was used to identify genetic variability of each strain. Preparation of the DNA to be used in the RAPD-PCR reaction was done by using the QIAGEN® Tissue and Blood single column kit (QIAGEN®, Venlo, The Netherlands). To obtain DNA, an overnight culture was prepared, struck for purity, pelleted, and DNA was extracted following the manufacturer's protocol. The RAPD-PCR reaction was performed with the following run conditions in a

thermal cycler: 95°C 5 min, followed by 45 cycles of (95°C 1 min, 36°C 1 min, 72°C 2 min), followed by 72°C 7 min, and finished with a 4°C indefinite hold to preserve the product. The RAPD-PCR product was analyzed by gel electrophoresis.

[00300] FIG. 2A illustrates RAPD-PCR results for CM256, where the first lane is primer 1 (P1), followed by primer 2 (P2), the molecular weight ladder (MW), then primer 3 (P3), primer 4 (P4), primer 5 (P5), and primer 6 (P6). FIG. 2B illustrates RAPD-PCR results for CM857, where the first lane is primer 1 (P1), followed by primer 2 (P2), primer 3 (P3), primer 4 (P4), primer 5 (P5), primer 6 (P6), and the molecular weight ladder (MW) in the last lane. FIG. 2C illustrates RAPD-PCR results for CM978, where the first lane is a molecular weight ladder (MW) and each subsequent lane is the banding pattern for primer 1 (P1), primer 2 (P2), primer 3 (P3), primer 4 (P4), primer 5 (P5), and primer 6 (P6) in the last lane. FIG. 2D illustrates RAPD-PCR results for CM1004, where the first lane is primer 1 (P1), followed by primer 2 (P2), the molecular weight ladder (MW), then primer 3 (P3), primer 4 (P4), primer 5 (P5), and primer 6 (P6). FIG. 2E illustrates RAPD-PCR results for MDG1607, where the first lane is a molecular weight ladder (MW) and each subsequent lane is the banding pattern for primer 1 (P1), primer 2 (P2), primer 3 (P3), primer 4 (P4), primer 5 (P5), and primer 6 (P6) in the last lane.

EXAMPLE 3
ENZYMATIC ACTIVITY

[00301] Strain specific enzyme activity for lipids, carbohydrates, proteins, xylan plant fibers, and cellulose was tested using agar methods known in the art and described below. Briefly, strains CM256, CM857, CM978, CM1004, and MDG1607 were cultured from a frozen stock by using a sterile inoculating loop to iso-streak the cells on tryptic soy agar media and incubated overnight at 37°C. When the colonies were visible the next day, they were morphologically examined for purity and a sterile inoculating loop was used to collect a single colony. The single colony was cultured to a higher density by inoculating it into tryptic soy broth and incubated overnight at 37°C, 230 rpm.

[00302] Agar plates for lipase, amylase, protease, xylanase, and cellulase were prepared as follows. For lipid testing, tryptic soy agar containing 5% tween 80 and 0.25% Spirit Blue (solvent blue 38, phthalocyanine metal complex) was used. For carbohydrate testing, tryptic soy agar containing 1% corn starch was used. For protein testing, tryptic soy agar containing 1% casein was used. For xylan plant fibers, tryptic soy agar containing 1% xylan was used. Lastly, for cellulose, tryptic soy agar containing 0.5% carboxymethylcellulose was used. For all compositions, ingredients were dissolved in the TSA media on a hot plate stirrer and subsequently autoclaved at 121°C for 30 minutes. Upon completion of the autoclave run, agar was poured into sterile petri dishes and allowed to dry inside a biological safety cabinet. The next day, the growth culture was standardized to a cell density of OD_{600nm} 0.8 using 0.1% peptone as a diluent. The agar plates for each respective recipe were inoculated with 10µL spots of culture, in triplicate, dried, and incubated overnight at 37°C. The following day, results were analyzed by observation of clearing zones around the spotted colonies indicating positive enzymatic activity, or no clearing zone for negative enzymatic activity.

WHAT IS CLAIMED IS:

1. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, wherein the *Bacillus* strain causes *E. coli, Salmonella,* and/or *Clostridium* inhibition in the animal.

2. The method of claim 1 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

3. The method of claim 1 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

4. The method of claim 3 wherein the poultry species is a broiler chicken.

5. The method of claim 1 wherein said additive comprises an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and any combination thereof.

6. The method of any one of claims 1 to 5 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

7. The method of any one of claims 1 to 5 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

8. The method of claim 3 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

9. The method of any one of claims 1 to 8 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

10. The method of any one of claims 1 to 9 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

11. The method of any one of claims 1 to 10 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

12. The method of any one of claims 1 to 10 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

13. The method of any one of claims 1 to 10 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

14. The method of any one of claims 1 to 10 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

15. The method of any one of claims 1 to 10 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

16. The method of any one of claims 1 to 10 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

17. The method of any one of claims 1 to 16 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

18. The method of any one of claims 1 to 16 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

19. The method of any one of claims 1 to 16 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

20. The method of any one of claims 1 to 19 further comprising the step of administering an antibiotic to the animal.

21. The method of any one of claims 1 to 20 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

22. The method of claim 21 wherein the enzyme is an NSPase or a phytase.

23. The method of claim 3 wherein the animal is a companion animal.

24. The method of claim 23 wherein the animal is a canine species or a feline species.

25. The method of claim 3 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

26. The method of claim 3 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

27. The method of any one of claims 1 to 26 wherein the feed composition is administered daily to the animal.

28. The method of claim 1 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

29. A method of controlling a detrimental effect of *E. coli, Salmonella,* and/or *Clostridium*, the method comprising the steps of administering to an animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and controlling the detrimental effect of *E. coli, Salmonella,* and/or *Clostridium* in the animal.

30. The method of claim 29 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

31. The method of claim 29 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

32. The method of claim 31 wherein the poultry species is a broiler chicken.

33. The method of any one of claims 29 to 32 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

34. The method of any one of claims 29 to 32 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

35. The method of claim 31 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

36. The method of any one of claims 29 to 35 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

37. The method of any one of claims 29 to 36 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

38. The method of any one of claims 29 to 37 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

39. The method of any one of claims 29 to 37 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

40. The method of any one of claims 29 to 37 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

41. The method of any one of claims 29 to 37 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

42. The method of any one of claims 29 to 37 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

43. The method of any one of claims 29 to 37 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

44. The method of any one of claims 29 to 43 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 5.0×10^{12} CFU/gram of the feed composition.

45. The method of any one of claims 29 to 43 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0×10^3 CFU/gram of the feed composition to about 1.0×10^7 CFU/gram of the feed composition.

46. The method of any one of claims 29 to 43 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0×10^4 CFU/gram of the feed composition.

47. The method of any one of claims 29 to 46 further comprising the step of administering an antibiotic to the animal.

48. The method of any one of claims 29 to 47 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

49. The method of claim 48 wherein the enzyme is an NSPase or a phytase.

50. The method of claim 31 wherein the animal is a companion animal.

51. The method of claim 50 wherein the animal is a canine species or a feline species.

52. The method of claim 31 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

53. The method of claim 31 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

54. The method of any one of claims 29 to 51 wherein the feed composition is administered daily to the animal.

55. The method of claim 29 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

56. A commercial package comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

57. A feed additive for an animal feed comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of

Bacillus strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

58. An additive for the drinking water of an animal comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

59. An animal feed composition comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), and combinations thereof.

60. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of claims 56 to 59 wherein the *Bacillus* strain causes an effect selected from the group consisting of preventing *E. coli, Salmonella,* and/or *Clostridium* disease, reducing *E. coli, Salmonella,* and/or *Clostridium* disease, maintaining the microbial balance of the animal, and combinations thereof.

61. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of claims 56 to 60, wherein the *Bacillus* strain reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

62. The feed additive or additive for the drinking water of the animal of claim 57 or 58 in the form of a concentrate.

63. The feed additive or additive for the drinking water of the animal of claim 57 or 58 in the form of a superconcentrate.

64. The feed additive, feed composition, or additive for the drinking water of the animal of any one of claims 57 to 63 in dry form.

65. The feed composition of claim 64 in pelleted form.

66. The commercial package of claim 56 wherein the strains are in a form selected from the group consisting of a powder, a liquid, and a pellet form.

67. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 66 further comprising a carrier for the *Bacillus* strains.

68. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of claim 67 wherein the carrier is selected from the group consisting of a bran, rice hulls, a salt, a dextrin, and combinations thereof.

69. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 68 in a bag.

70. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of claim 69 wherein the bag is a plastic bag.

71. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 70 further comprising instructions for use of one or more of the *Bacillus* strains.

72. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of claims 69 to 71 in a 20-pound bag.

73. The commercial package, feed additive, feed composition, or additive for the drinking water of the animal of any one of claims 69 to 71 in a 50-pound bag.

74. The feed additive or additive for the drinking water of the animal of any one of claims 57, 58, 60 to 64, or 67 to 73 in powder form.

75. The feed additive or additive for the drinking water of the animal of any one of claims 57, 58, 60 to 61, or 69 to 71 in liquid form.

76. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 75 in a container for commercial use.

77. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of claim 76 wherein the container comprises plastic.

78. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of claim 76 wherein the container comprises paper.

79. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 78 further comprising a binder.

80. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of claim 79 wherein the binder is selected from the group consisting of clay, yeast cell wall components, aluminum silicate, and glucan, or combinations thereof.

81. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 80 comprising isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

82. The commercial package, feed additive, additive for the drinking water of the animal, or feed composition of any one of claims 56 to 80 comprising all of isolated *Bacillus* strains MDG1607 (NRRL No. B-67666), CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), and CM1004 (NRRL No. B-67708).

83. A method of feeding an animal, the method comprising the step of administering to the animal a feed composition or drinking water comprising an effective amount of an additive comprising an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof.

84. The method of claim 83 wherein the animal has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

85. The method of claim 83 wherein the animal is selected from the group consisting of a poultry species, a porcine species, a caprine species, a bovine species, an ovine species, an equine species, and a companion animal.

86. The method of claim 85 wherein the poultry species is a broiler chicken.

87. The method of any one of claims 83 to 86 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition prevents *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

88. The method of any one of claims 83 to 86 wherein the *E. coli, Salmonella,* and/or *Clostridium* inhibition reduces *E. coli, Salmonella,* and/or *Clostridium* disease in the animal.

89. The method of claim 85 wherein the animal is a porcine species and the porcine species is selected from the group consisting of a grow finish pig, a nursery pig, a sow, and a breeding stock pig.

90. The method of any one of claims 83 to 89 wherein the *Bacillus* strain produces an enzyme selected from the group consisting of an α-galactosidase, a protease, a lipase, an amylase, a xylanase, a cellulase, and combinations thereof.

91. The method of any one of claims 83 to 90 further comprising the step of administering to the animal another bacterial strain selected from the group consisting of another *Bacillus* strain, a lactic acid bacterial strain, and combinations thereof.

92. The method of any one of claims 83 to 91 wherein the strain administered is *Bacillus* strain CM256 (NRRL No. B-67706).

93. The method of any one of claims 83 to 91 wherein the strain administered is *Bacillus* strain CM857 (NRRL No. B-67705).

94. The method of any one of claims 83 to 91 wherein the strain administered is *Bacillus* strain CM978 (NRRL No. B-67703).

95. The method of any one of claims 83 to 91 wherein the strain administered is *Bacillus* strain CM1004 (NRRL No. B-67708).

96. The method of any one of claims 83 to 91 wherein the strain administered is *Bacillus* strain MDG1607 (NRRL No. B-67666).

97. The method of any one of claims 83 to 91 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all administered.

98. The method of any one of claims 83 to 97 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 5.0 x 10^{12} CFU/gram of the feed composition.

99. The method of any one of claims 83 to 97 wherein the *Bacillus* strain is administered in the feed composition at a dose of about 1.0 x 10^3 CFU/gram of the feed composition to about 1.0 x 10^7 CFU/gram of the feed composition.

100. The method of any one of claims 83 to 97 wherein the *Bacillus* strain is administered in the feed composition at a dose greater than about 7.0 x 10^4 CFU/gram of the feed composition.

101. The method of any one of claims 83 to 100 further comprising the step of administering an antibiotic to the animal.

102. The method of any one of claims 83 to 100 further comprising the step of administering to the animal an enzyme selected from the group consisting of a galactosidase, a protease, a lipase, an amylase, a hemicellulase, an arabinoxylanase, a xylanase, a cellulase, an NSPase, a phytase, and combinations thereof.

103. The method of claim 102 wherein the enzyme is an NSPase or a phytase.

104. The method of claim 85 wherein the animal is a companion animal.

105. The method of claim 104 wherein the animal is a canine species or a feline species.

106. The method of claim 85 wherein the animal is a sow and the *Bacillus* strain is administered during lactation.

107. The method of claim 85 wherein the animal is a sow and the *Bacillus* strain is administered during gestation.

108. The method of any one of claims 83 to 105 wherein the feed composition is administered daily to the animal.

109. The method of claim 83 wherein the animal is selected from the group consisting of a chicken, a pig, a horse, a pony, a cow, a turkey, a goat, a sheep, a quail, a pheasant, an ostrich, a duck, a fish, a crustacean, and combinations thereof.

110. A method of treating a plant to inhibit a bacterial disease caused by *E. coli, Salmonella,* and/or *Clostridium*, the method comprising contacting the plant with a composition comprising an effective amount of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), MDG1607 (NRRL No. B-67666), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-

67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), and combinations thereof, and inhibiting *E. coli, Salmonella,* and/or *Clostridium* in the plant.

111. The method of claim 110 wherein the plant has a disease caused by *E. coli, Salmonella,* and/or *Clostridium*.

112. The method of claim 110 or 111 wherein the strain used is *Bacillus* strain CM256 (NRRL No. B-67706).

113. The method of claim 110 or 111 wherein the strain used is *Bacillus* strain CM857 (NRRL No. B-67705).

114. The method of claim 110 or 111 wherein the strain used is *Bacillus* strain CM978 (NRRL No. B-67703).

115. The method of claim 110 or 111 wherein the strain used is *Bacillus* strain CM1004 (NRRL No. B-67708).

116. The method of claim 110 or 111 wherein the strain used is *Bacillus* strain MDG1607 (NRRL No. B-67666).

117. The method of claim 110 or 111 wherein *Bacillus* strains CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), and MDG1607 (NRRL No. B-67666) are all used to treat the plant.

118. The method of claim 109 or 110 wherein isolated *Bacillus* strain MDG1607 (NRRL No. B-67666), or a strain having all of the identifying characteristics of *Bacillus* strain MDG1607 (NRRL No. B-67666), is used to treat the plant in combination with one or more of an isolated *Bacillus* strain selected from the group consisting of *Bacillus* strain CM256 (NRRL No. B-67706), CM857 (NRRL No. B-67705), CM978 (NRRL No. B-67703), CM1004 (NRRL No. B-67708), a strain having all of the identifying characteristics of *Bacillus* strain CM256 (NRRL No. B-67706), a strain having all of the identifying characteristics of *Bacillus* strain CM857 (NRRL No. B-67705), a strain having all of the identifying characteristics of *Bacillus* strain CM978 (NRRL No. B-67703), and/or a strain having all of the identifying characteristics of *Bacillus* strain CM1004 (NRRL No. B-67708).

Escherichia coli	CM256	CM857	CM978	CM1004	MDG1607
Field Isolate 1	+	+	+	+	+
Field Isolate 2	+	+/-	+	+/-	+
Field Isolate 3	+	+/-	+	+/-	+
Field Isolate 4	+	+/-	+	+	+
Field Isolate 5	+	+/-	+	+	+
Field Isolate 6	+/-	+/-	+	+	+
Field Isolate 7	+	+/-	+/-	+/-	+
Field Isolate 8	+	+/-	+	+	+
Field Isolate 9	+	+	+	+/-	+
Field Isolate 10	+	+	+	+	+
Field Isolate 11	+	+	+	+	+
Field Isolate 12	+/-	+	+	+	+
Field Isolate 13	+/-	+	+	+	+
Field Isolate 14	+	+/-	+/-	+/-	+
Field Isolate 15	+	+/-	+/-	+	+
Field Isolate 16	+	+/-	+	+	+
Field Isolate 17	+	+/-	+	+	+
Field Isolate 18	+	+/-	+	+	+
Field Isolate 19	+	+/-	+	+/-	+
Field Isolate 20	+/-	+/-	+	+/-	+
Field Isolate 21	+/-	+/-	+	+/-	+
Field Isolate 22	+/-	+/-	+	+	+
Field Isolate 23	+/-	+/-	+	+	+
Field Isolate 24	+	+	+/-	+/-	+
Field Isolate 25	+	+/-	+	+/-	+
Field Isolate 26	+	+/-	+	+/-	+
Field Isolate 27	+	+/-	+	+/-	+
Field Isolate 28	+	+/-	+	+/-	+
Field Isolate 29	+	+/-	+	+/-	+
Field Isolate 30	+	+	+	+/-	+
Field Isolate 31	+	+/-	+	+	+
Field Isolate 32	+	+/-	+/-	+	+

Fig. 1A

Clostridium perfringens	CM256	CM857	CM978	CM1004	MDG1607
Field Isolate 1	+	-	-	-	+
Field Isolate 2	+	-	-	+/-	+
Field Isolate 3	+/-	-	-	-	+
Field Isolate 4	+/-	-	-	-	+
Field Isolate 5	+	+	+	+	+
Field Isolate 6	+	+	+	+	+
Field Isolate 7	+	+	+	+	+
Field Isolate 8	+	+	+	+	+
Field Isolate 9	+	+	+	+	+
Field Isolate 10	+	+	+	+	+
Field Isolate 11	+	+	+	+	+
Field Isolate 12	+	+	+	+	+
Field Isolate 13	+	+	+	+	+
Field Isolate 14	+	+	+/-	+	+
Field Isolate 15	+	+	+	+	+
Field Isolate 16	+	+	+	+/-	+
Field Isolate 17	+	+	+	+	+
Field Isolate 18	+	+	-	-	+
Field Isolate 19	+	+	+	+	+
Field Isolate 20	+	-	+	+	+
Field Isolate 21	+	-	-	+	+
Field Isolate 22	+	+	+	+	+
Field Isolate 23	+	-	+/-	-	+
Field Isolate 24	+	+/-	+	+	+

Fig. 1B

Salmonella enterica	CM256	CM857	CM978	CM1004	MDG1607
ATCC Salmonella enterica Enteritidis	+	+/-	+	+	+
ATCC Salmonella enterica Typhimurium	+	+/-	+	+	+
ATCC Salmonella enterica Heidelberg	+	+/-	+	+	+
ATCC Salmonella enterica Infantis	+	+	+	+	+
ATCC Salmonella enterica Newport	+	+/-	+	+	+
Veterinary Clinical Isolate - Enteritidis	+	+/-	+	+	+/-
Veterinary Clinical Isolate - Heidelberg	+	-	+	+	+/-
Veterinary Clinical Isolate - Montevideo	+	+/-	+	+	+/-
Field Isolate 1	+	+	+	+	+
Field Isolate 2	+/-	+	+	+	+
Field Isolate 3	+	+	+	+	+
Field Isolate 4	+	+	+	+/-	+
Field Isolate 5	+	+	+	+	+/-
Field Isolate 6	+	+	+	+	+
Field Isolate 7	+/-	+	+	+	+
Field Isolate 8	+/-	+	+	+	+
Field Isolate 9	+	+	+	+	+
Field Isolate 10	+	+	+	+/-	+/-
Field Isolate 11	+	+	+	+/-	+
Field Isolate 12	+	+	+	+	+
Field Isolate 13	+	+	+	+	+
Field Isolate 14	+	+	+	+/-	+/-
Field Isolate 15	+	+	+	+	+
Field Isolate 16	+	+	+	+	+
Field Isolate 17	+	+	+	+	+
Field Isolate 18	+/-	+	+	+	+
Field Isolate 19	+	+	+	+	+
Field Isolate 20	+/-	+	+	+	+
Field Isolate 21	+/-	+	+	+	+
Field Isolate 22	+	+	+	+	+/-
Field Isolate 23	+	+	+	+	+
Field Isolate 24	+	+	+	+	+

Fig. 1C

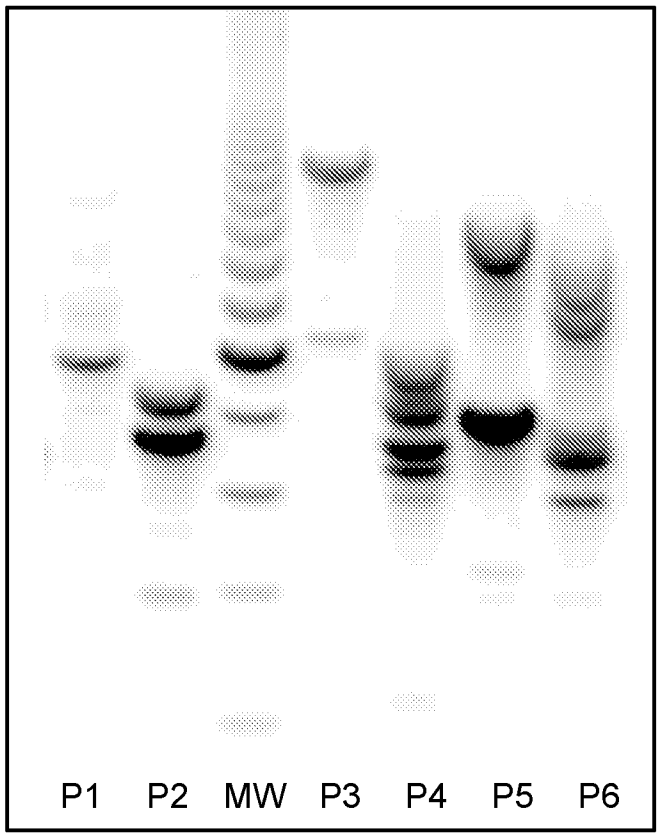

Fig. 2A

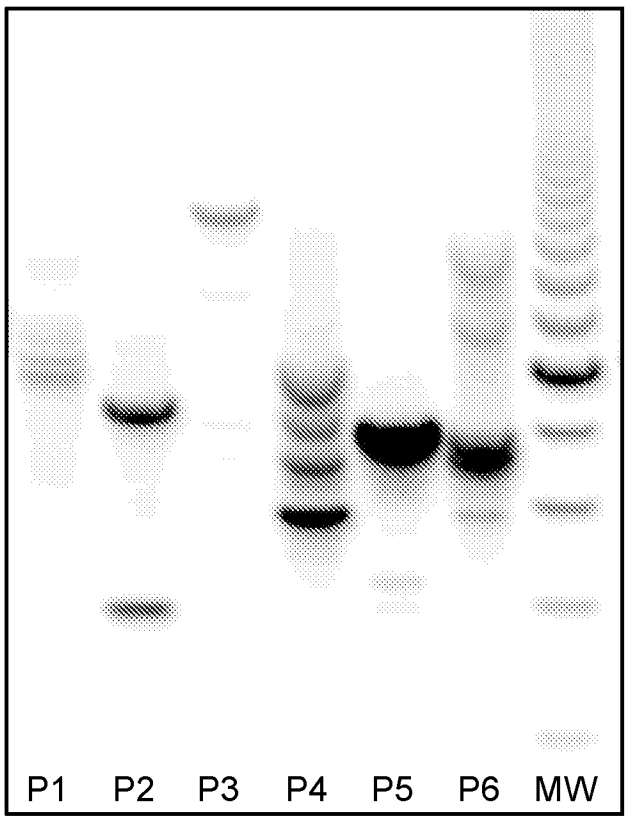

Fig. 2B

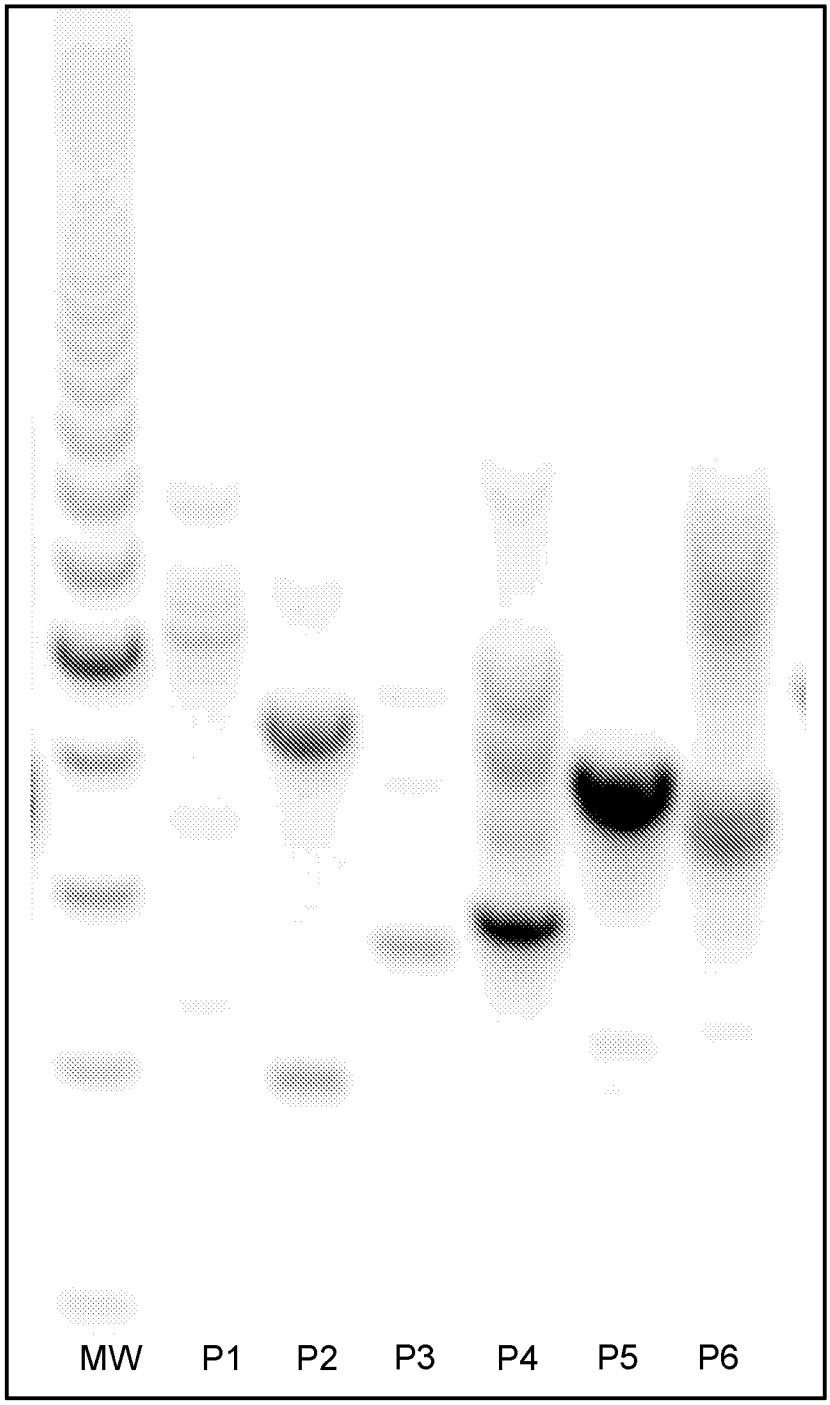

Fig. 2C

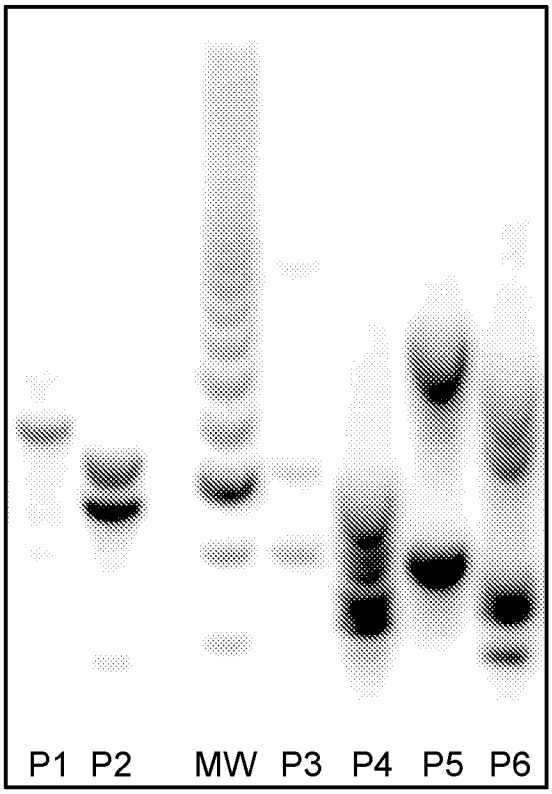

Fig. 2D

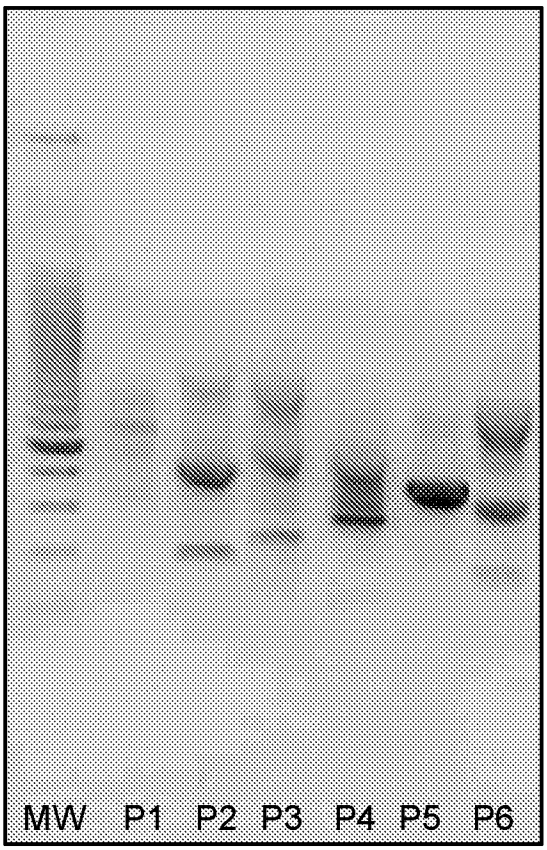

Fig. 2E

Enzyme Production					
	CMC	Lipase	Amylase	Xylanase	Protease
CM0256	-	+	+	+	+
CM0857	+	+	+	+	+
CM0978	+	+	+	+	+
CM1004	+	+	+	+	+
MDG1607	+	+	+	+	+

Fig. 3