



Bulgaria. Huvepharma's wholly-owned United States subsidiary, Huvepharma, Inc., has an address at 525 Westpark Dr. # 230, Peachtree City, Georgia 30269. Huvepharma, Inc. operates six production facilities in the United States, and commercializes Plaintiffs' phytase product OptiPhos® in the United States under the terms of an agreement with Huvepharma EOOD.

4. Huvepharma is a global biotech and pharmaceutical company that develops, manufactures, and commercializes human and animal health products, including enzymes for food and animal feed. One of Huvepharma's products that it successfully sells in the United States is OptiPhos®, which is an additive to feed for animals, including swine and poultry, and in particular an *Escherichia coli* ("*E.coli*") derived 6-phytase, which is recombinantly produced in the heterologous yeast host *Pichia pastoris*, in a submerged fermentation process. OptiPhos® is available in 3 different forms, each suitable for a specific application: 1) a coated form used for pelleted feeds, 2) a liquid form used for post pelleting liquid application processes, and 3) a granular form used in mash and pelleted feeds.

5. Previously competing phytase products were less effective than OptiPhos® because they only operate effectively within a limited pH range, and are thermally intolerant during the feed manufacturing process when the phytase is combined with animal feed. These previous competing phytase products were also inferior to OptiPhos® because they degrade when exposed to pepsin, which is a naturally present (endogenous) enzyme produced in the stomach of animals.

6. Huvepharma's OptiPhos® is more effective in animal diets for poultry and swine than these previously competing products because it works effectively at a broad pH range (between pH 1 and 5), is thermally tolerant during the manufacturing process when combined with animal feed, and is relatively insensitive to degradation by pepsin. OptiPhos® also operates

faster than others previously used in releasing phosphorus from its indigestible form phytate, which is the natural form in which most of the phosphorus is stored in grains and seeds, and thus enables the poultry and swine ingesting the product to grow faster and to receive other health benefits.

7. The method of manufacturing Huvepharma's OptiPhos® was invented and initially developed in the 1998 time frame by Dr. Xingen Lei, a researcher at Cornell University, and constituted a publicly recognized breakthrough in the field of phytase enzymes for integration into animal feed. Cornell Research Foundation, Inc. obtained the '150, '063, and '232 Patents (the "Patents") that disclose, claim, and otherwise protect Dr. Lei's inventive method of producing OptiPhos®.

8. Ultimately, Cornell Research Foundation, Inc. entered into an exclusive license with Huvepharma in return for Huvepharma commercializing OptiPhos® in the United States. However, as explained below, Huvepharma's commercialization efforts have been negatively impacted, and the patent rights have been infringed, by the actions of Defendants, and in particular based on Defendants' manufacture, importation, sale, distribution, and commercialization in the United States of a product line that infringes claims of the patents, *i.e.*, the Phyzyme phytase product line.

9. Upon information and belief, the Phyzyme phytase product line includes products that are and have been commercialized in the United States under various trade names, including at least Phyzyme, Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, and Phyzyme XP Liquid. The products in the Phyzyme phytase product line are also manufactured and sold with different concentration designations, for example Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000G, Phyzyme XP 15000L, Phyzyme XP 10000 TPT, etc. These Phyzyme phytase products

are or have been manufactured outside of the United States, and imported into and commercialized by Defendants in the United States. For example, Phyzyme XP 10000 TPT is or has been manufactured overseas, imported into the United States, and commercialized in the United States by Defendants.

10. Defendant E. I. du Pont de Nemours and Company (“DuPont”) is a corporation organized under the laws of Delaware, with a registered office at Corporation Trust Center, 1209 Orange Street, Wilmington, Delaware, 19801. DuPont is a wholly owned subsidiary of DowDuPont Inc., a corporation organized under the laws of Delaware, with registered offices at 2211 H.H. Dow Way, Midland, Michigan 48674.

11. Defendant DuPont Industrial Biosciences USA, LLC (“DuPont I.B.”) is a limited liability company organized under the laws of Delaware, with its principal place of business at Dupont Experimental Station, 200 Powder Mill Road, Wilmington, Delaware 19803. DuPont I.B. is a wholly-owned subsidiary of DuPont, and effectively controlled by DuPont.

12. Defendant Danisco USA Inc. (“Danisco USA”) is a corporation organized under the laws of Delaware, with its principal place of business at 10994 Three Mile Road, Thomson, Illinois, 61285. Danisco USA is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont.

13. Defendant Danisco US Inc. (“Danisco US”) is a corporation organized under the laws of Delaware, with its principal place of business at 925 Page Mill Road, Palo Alto, California 94304. Danisco US is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont. Danisco US operates and/or has operated as DuPont I.B.

14. Genencor International, B.V. (“Genencor”) is a corporation organized under the laws of The Netherlands, with its principal place of business at Archimedesweg 30, 2333 CN

Leiden, The Netherlands. Genencor is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont.

15. Danisco Argentina S.A. (“Danisco Argentina”) is a corporation organized under the laws of Argentina, with its principal place of business at Ingeniero E. Butty 240, Buenos Aires, Argentina. Danisco Argentina is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont.

16. Danisco Mexico S.A. de C.V. (“Danisco Mexico”) is a corporation organized under the laws of Mexico, with its principal place of business at KM 37 Carr. Colima-Manzanillo, MEX-28100 Tecoman, Mexico. Danisco Mexico is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont.

17. Finnfeeds Finland Oy (“Finnfeeds”), formerly Finnfeeds Oy Danisco Animal Nutrition Finland, is a corporation organized under the laws of Finland, with its principal place of business at Satamatie 2, FI-21100 Naantali, Finland. Finnfeeds is a wholly owned subsidiary of DuPont, and effectively controlled by DuPont.

18. Upon information and belief, Phyzyme XP phytase was developed in the 2003 time frame under a strategic alliance with Danisco Animal Nutrition, a subsidiary of Danisco AS and Verenium<sup>1</sup>. Danisco Animal Nutrition was the feed ingredients business unit of Danisco AS, Denmark, both of which defendant DuPont acquired in 2010 and now operate under DuPont I.B. Under the collaboration, Diversa was responsible for manufacturing Phyzyme phytase products, while Danisco Animal Nutrition held exclusive worldwide marketing rights.

19. Upon information and belief, beginning in the 2003 time frame, Verenium and/or Danisco Animal Products contracted with Fermic S.A. de C.V. in Mexico (“Fermic”) to

---

<sup>1</sup> In 2013, BASF Corporation acquired Verenium Corporation (“Verenium”). Verenium’s predecessor-in-interest is Diversa Corporation.

manufacture Phyzyme phytase products in Mexico, which was then imported by Defendants and/or their predecessors-in-interest into the United States.<sup>2</sup> Defendants have a long and close relationship with Fermic. When DuPont acquired Danisco AS in 2010, DuPont and/or co-defendants or their subsidiaries continued to use Fermic to manufacture Phyzyme phytase products in Mexico. DuPont, alone or through co-defendants or other subsidiaries, controls Fermic's practice of Huvepharma's patented processes claimed in the '150 patent, the '063 patent, and/or the '232 patent relating to the manufacture of Phyzyme phytase products, at least some of which is then imported into the United States and used, offered for sale, sold, and/or distributed by Defendants in the United States.

20. Upon information and belief, beginning in the 2008 time frame, DuPont's subsidiaries Genencor and/or Finnfeeds have been engaged in the manufacture of Phyzyme phytase products overseas, including the use of *E.coli* derived phytase enzymes that are developed for use in animal feeds, at least some of which Defendants then imported into the United States. Beginning in the 2010 time frame, Genencor and/or Finnfeeds began manufacturing Phyzyme phytase products at a second location in Europe including the use of *E.coli* derived phytase enzymes that are developed for use in animal feeds, at least some of which was then imported by defendants into the United States.

21. Upon information and belief, DuPont is and/or has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

---

<sup>2</sup> Fermic S.A. de C.V. is a corporation organized under the laws of Mexico, with its principal place of business at Reforma #873 Col. San Nicolas Tolentino, Del Iztapalapa, 09850, Mexico. Fermic is a custom manufacturer of biotechnological products. Upon information and belief, Fermic is and/or has been engaged in the manufacture of Phyzyme phytase products in Mexico, including the use of *E.coli* derived phytase enzymes that are developed for use in animal feeds.

22. Upon information and belief, Danisco Argentina is and/or has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products manufactured by Fermic, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

23. Upon information and belief, Danisco Mexico is and/or has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products manufactured by Fermic and Phyzyme phytase products manufactured by Genencor and/or Finnfeeds, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

24. Upon information and belief, Finnfeeds is and/or has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products manufactured by Fermic and Phyzyme phytase products manufactured by Finnfeeds consigned to Danisco Mexico, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

25. Upon information and belief, Genencor has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products consigned to Danisco Mexico, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

26. Upon information and belief, Danisco US is and/or has been engaged in the importation into the United States of *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products manufactured by Finnfeeds, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

27. Upon information and belief, Danisco USA is and/or has been engaged in the importation into the United States *E.coli* derived phytase enzymes developed for use in animal feeds, including at least Phyzyme phytase products manufactured by Finnfeeds, which are used, offered for sale, sold, and/or distributed by Defendants in the United States.

28. Upon information and belief, Defendants have and/or are using, advertising, offering for sale, selling, distributing and/or otherwise commercializing at least the imported Phyzyme phytase products within the United States. Defendants perform at least some of the commercialization of Phyzyme phytase products in the United States under the trade name DuPont Danisco Animal Products.

29. Upon information and belief, DuPont has and/or is using, advertising, offering for sale, selling, distributing and/or otherwise commercializing at least the imported Phyzyme phytase products within the United States.

30. Upon information and belief, DuPont I.B. has and/or is using, advertising, offering for sale, selling, importing, distributing and/or otherwise commercializing at least the imported Phyzyme phytase products within the United States.

31. Upon information and belief, Danisco USA has and/or is using, advertising, offering for sale, selling, distributing and/or otherwise commercializing at least the imported Phyzyme phytase products within the United States.

32. Upon information and belief, Danisco US has and/or is using, advertising, offering for sale, selling, distributing and/or otherwise commercializing at least the imported Phyzyme phytase products within the United States.

33. Upon information and belief, DuPont wholly owns defendants DuPont I.B., Danisco US, and Danisco USA, each of which has engaged at least in infringing activities described herein. (Ex. 20.)

### **JURISDICTION AND VENUE**

34. This action arises under the Patent Laws of the United States, Title 35, United States Code, §§ 1 *et seq.*, including 35 U.S.C. §§ 271 and 281.

35. This Court has jurisdiction over the subject matter of this action pursuant to 28 U.S.C. §§ 1331 and 1338(a).

36. This Court has personal jurisdiction over defendant DuPont, at least because DuPont has purposefully availed itself of the benefits and protections of Delaware state law by incorporating in Delaware.

37. This Court has personal jurisdiction over defendant DuPont I.B., at least because DuPont I.B. has purposefully availed itself of the benefits and protections of Delaware state law by incorporating in Delaware as a limited liability company.

38. This Court has personal jurisdiction over defendant Danisco USA, at least because Danisco USA has purposefully availed itself of the benefits and protections of Delaware state law by incorporating in Delaware.

39. This Court has personal jurisdiction over defendant Danisco US, at least because Danisco US has purposefully availed itself of the benefits and protections of Delaware state law by incorporating in Delaware.

40. Venue is proper in this District under 28 U.S.C. §§ 1391(b) and (c), and 1400(b) because defendants DuPont, Danisco USA, and Danisco US are Delaware corporations, DuPont

I.B. is a Delaware company, and Delaware is a convenient forum for resolution of the parties' disputes set forth herein.

### **BACKGROUND**

41. The ingestion by certain animals, such as poultry and swine, of phosphate ("P") helps to accelerate growth and provides other health benefits. Phytate (myo-inositol hexophosphate), which includes P, is often included in animal feed for this purpose, *i.e.*, to enable the animals to ingest P. Phytases, which are a specific group of monoester phosphatases, initiate the release of P from the phytate. (Ex. 1: Column 1, Lines 10-31.)

42. Swine and poultry have little natural phytase in their gastrointestinal tracts. Thus, these animals naturally fail to effectively release P from the phytate in their food, and thus fail to benefit thereby. Under these circumstances, the phytate with P passes through the animals' gastrointestinal tracts and excretes as manure, which unfortunately pollutes the environment. In addition, the diet of the swine and poultry needs to be supplemented with inorganic P, which is a non-renewable nutrient, such as in the form of a vitamin. Phytase has therefore been added to animal feed to enable the animals to initiate the release of P from the phytate.

43. Two phytases, PhyA and PhyB, were used prior to the inventions that are the subject of the patents-in-suit. PhyA and PhyB were extracted from *Aspergillus niger* NRRL3135 (*A. niger*), and cloned and sequenced. (Ex. 1: Column 1, Lines 32-40.) As an example, a PhyA gene was introduced into *A. niger*, *i.e.*, a homologous host, and this phytase was to a certain degree effective in releasing P from phytate in animal feed. In particular, supplemental microbial phytase of this source in the diets for swine and poultry was shown to be effective in allowing the animals to release P from the phytate in their feed. However, PhyA and PhyB were subject to problems. For example, PhyA and PhyB were expensive to produce. In addition,

certain aspects of PhyA and PhyB made them difficult to manufacture and incorporate effectively as functional enzymes into animal feed. For example, the manufacturing process of feed pellets involves the application of a certain amount of heat (*i.e.*, increase in temperature), but unfortunately PhyA and PhyB are subject to being destroyed when exposed to this heat. In other words, the PhyA and PhyB phytases are not sufficiently thermotolerant for this manufacturing process to avoid degradation. (Ex. 1: Column 2, Lines 5-33.)

44. To solve the shortcomings and problems of producing a viable, *i.e.*, functional, phytase enzyme for use in animal feed, Dr. Lei discovered the inventions that are the subject of the patents-in-suit while he was a professor in the Department of Animal Science and Department of Horticultural Sciences at Cornell University. The production methods Dr. Lei invented produced phytases that were at least as effective as, yet more thermostable than, the existing PhyA and PhyB phytases, and therefore were more effective in the animal feed industry.

45. The patents-in-suit involve producing phytases that are encoded by genes isolated from bacterial cells, *i.e.*, from *E.coli*. These encoded genes are not expressed in their homologous bacterial host, but instead are expressed in either a fungal strain or a yeast strain, *i.e.*, a heterologous host. Isolating the expressed, encoded genes leads to an *E.coli* phytase that catalyzes the release of P from phytate. The heterologous host phytase production methods advantageously create phytases, which along with other improved biochemical properties, are characterized with improved thermal stability.

46. Cornell Research Foundation (“Cornell”), wishing to commercialize Dr. Lei’s breakthrough discoveries, collaborated with Phytex, LLC, which was a company formed to produce and commercialize Dr. Lei’s new thermostable phytase. On September 1, 2001, Cornell entered into an exclusive license agreement with Phytex in return for Phytex producing and

commercializing the thermostable phytase. Phytex commercialized the phytase product under the trademarked name “OptiPhos®,” which it began manufacturing and selling in the United States in 2006.

47. In 2013, Huvepharma acquired all of Phytex’s rights in the thermostable phytase, *i.e.*, OptiPhos®. In particular, Huvepharma acquired Phytex’s exclusive license agreement with Cornell, which gave Huvepharma the exclusive rights to produce and commercialize OptiPhos®, and an exclusive license to Cornell’s patents. Huvepharma has been manufacturing and commercializing OptiPhos®, which is recognized as the most efficient and stable phytase available in the market with a track record of proven effectiveness. Huvepharma has continually produced and sold OptiPhos® in the United States since acquiring the rights discussed above.

48. Upon information and belief, beginning in the 2010 time frame, DuPont, by and through the other Defendants in this action, began manufacturing, importing, selling, offering to sell, distributing, and otherwise commercializing phytase products marketed under the trade name brand Phyzyme XP. At least the accused products Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT (hereinafter “Phyzyme phytase products”, are and/or have been manufactured outside of the United States, and then imported into and commercialized in the United States by Defendants, and used, offered for sale, distributed, and/or sold by Defendants in the United States.

49. Upon information and belief, the accused Phyzyme phytase products are produced using the same methods in the context of and as claimed in the patents. Thus, the evidence and descriptions below describing the method of producing Phyzyme XP are applicable to any one or

more of the other accused products Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

50. Upon information and belief, beginning in the 2010 time frame, DuPont acquired the corporation Danisco AS (“Danisco”), headquartered in Belgium, and began operating its manufacturing plant in Finland that was previously owned by Danisco subsidiary Finnfeeds, which is now a wholly owned subsidiary of DuPont and DuPont Industrial Biosciences or one of DuPont’s wholly-owned subsidiaries, to produce Phyzyme phytase products.

51. Upon information and belief, DuPont’s subsidiary Genencor at least operates as DuPont’s Phyzyme phytase products manufacturer, sales and/or distribution subsidiary business in Europe.

52. Upon information and belief, beginning in the 2010 time frame, at least the defendants DuPont, Danisco USA and Danisco US imported Phyzyme phytase products that were manufactured by Finnfeeds and/or Genencor in Finland into the United States.

53. Upon information and belief, beginning in the 2010 time frame, at least the defendant DuPont I.B., through its wholly-owned subsidiary Finnfeeds, imported Phyzyme phytase products that were manufactured by Fermic in Mexico into the United States.

54. Additionally, upon information and belief, the wholly-owned DuPont foreign subsidiaries Danisco Argentina and Danisco Mexicana import and/or have imported Phyzyme phytase products that were manufactured by Fermic in Mexico into the United States.

55. Upon information and belief, after importation of the Phyzyme phytase products including Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme

XP 150000L, and/or Phyzyme XP 10000TPT, the Phyzyme phytase products were transferred to at least DuPont, Danisco USA, and/or Danisco US which entities then used, offered for sale, distributed, and/or sold the Phyzyme phytase products in the United States under the company trade name DuPont Danisco Animal Products.

56. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products by Defendants is a use, offer for sale, and/or sale of phytase imported into the United States by Defendants that was produced and/or is being produced in yeast. (Ex. 4 at 1-3; Ex. 5 at 1-3, Ex. 6 at 1-3.)

57. For example, Phyzyme XP phytase is sourced from an *E.coli* species bacterium and is expressed in the yeast *Saccharomyces pombe*. (Ex. 7 at 2.) For example, Phyzyme XP phytase is an enzyme feed additive with 6-phytase as its main activity, produced after fermentation with the genetically modified heterologous yeast host *Schizosacchoaromyces pombe* (“*S.pombe*”). (Ex. 10 at 1.) In an example, Genencor operates biorefineries that manufacture Phyzyme phytase products as feed enzymes for animal feed. The manufacturing includes fermentation, recovery, purification, and formulation processing of Phyzyme phytase products for animal feed. (Ex. 9 at 1-6; Ex. 8 at 1; Ex. 18 at 2, 4-6.) For example, the additive Phyzyme XP 10000 (TPT/L) phytase is a preparation of 6-phytase produced by the genetically modified heterologous yeast host *Schizosacchoaromyces pombe* and available in solid (Phyzyme XP 5000G and Phyzyme XP 10000TPT) and liquid forms (Phyzyme XP 5000L and Phyzyme XP 10000L). The product Phyzyme XP 10000 (TPT/L) is a two-times concentrated version of the Phyzyme XP 5000. (Ex. 12 at 4; Ex. 13 at 3.) The product Phyzyme XP 5000L is derived from the same organism as the granulated Phyzyme XP 5000G and varies only in the final formulation. (Ex. 11 at 5; Ex. 12 at 4.)

58. In another example, the packaging label of an order of Phyzyme XP 10000 TPT acquired in the United States by Huvepharma demonstrates that Phyzyme XP 10000 TPT was manufactured in Finland and sold by Genencor. (Ex. 8 at 1.) Analytical testing of the Phyzyme XP 10000 TPT sample in Exhibit 8 by Plaintiffs confirmed that the sample contained a yeast. In another example, a Phyzyme XP 10000 TPT phytase sample acquired by Huvepharma in Belgium was manufactured by Genencor in Finland. (Ex. 14 at 1-7.) Analytical testing of the Phyzyme XP 10000 TPT sample in Exhibit 8 by Plaintiffs confirmed that the sample contained a yeast.

59. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products by Defendants is a use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States by Defendants that was produced and/or is being produced by providing a heterologous polynucleotide from non-yeast organism that encodes a protein or polypeptide comprising either a PhyA phytase or an AppA phytase, and that was produced and/or is being produced by providing a polynucleotide encoding a phytase from *E.coli*. (Ex. 4 at 4-5; Ex. 5 at 4-5; Ex. 6 at 4-5.)

60. For example, Phyzyme phytase products advertised and sold by DuPont Danisco Animal Nutrition was sourced from *E.coli* species bacterium and expressed in the heterologous yeast host *Saccharomyces pombe*. (Ex. 7 at 2, 4.) As an example, Phyzyme XP 5000L/G is an enzyme feed additive with 6-phytase as its main activity, and the production strain for Phyzyme XP is derived from a heterologous strain of the fission yeast host *Schizosacchoaromyces pombe*. (Ex. 11 at 5; Ex. 12 at 4.) In an example, Phyzyme XP 10000 (TPT/L) is a preparation of 6-phytase produced by the genetically modified heterologous micro-organism yeast host

*Schizosacchoaromyces pombe*. The product Phyzyme XP 10000 (TPT/L) is a two-times concentrated version of the Phyzyme XP 5000. (Ex. 12 at 4; Ex. 13 at 3.)

61. For example, the donor organism for Phyzyme XP is *E.coli* B ATCC 11303. The genetic modification process includes the open reading frame (ORF) of the appA 6-phytase gene without its native *E.coli* leader peptide sequence that was amplified and ligated in an expression vector. The nucleotide sequence of the insert was determined in its entirety to confirm that no mutations had been introduced. (Ex. 10 at 6.) The final production strain ATCC5233 expresses the 6-phytase appA gene from *E.coli* B. It contains the expression cassette integrated into the chromosome. (Ex. 10 at 9.)

62. For example, the additive Phyzyme XP 10000 (TPT/L) is a preparation of 6-phytase produced by the genetically modified heterologous micro-organism yeast host *Schizosacchoaromyces pombe*. The product Phyzyme XP 10000 (TPT/L) is a two-times concentrated version of the Phyzyme XP 5000. (Ex. 12 at 4; Ex. 13 at 3.)

63. In further examples, analytical results of the Phyzyme XP 10000 TPT sample of Exhibit 8 confirmed the presence of an AppA *E.coli* bacterium; and analytical results of the Phyzyme XP 10000 TPT sample of Exhibit 14 confirmed the presence of an AppA *E.coli* bacterium.

64. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States is a use, offer for sale, and/or sale of Phyzyme phytase products phytase imported into the United States that was produced and/or is being produced by expressing the protein or polypeptide in a yeast.

65. For example, Phyzyme XP is sourced from an *E.coli* species bacterium and is expressed in the yeast *Saccharomyces pombe*. (Ex. 7 at 2.)

66. For example, Phyzyme XP 5000L/G is an enzyme feed additive with 6-phytase as its main activity, and the production strain for Phyzyme XP is derived from a strain of the fission yeast *Schizosaccharomyces pombe*. (Ex. 11 at 5; Ex. 12 at 4.)

67. For example, the additive Phyzyme XP 10000 (TPT/L) is a preparation of 6-phytase produced by the genetically modified heterologous micro-organism yeast host *Schizosaccharomyces pombe*. The product Phyzyme XP 10000 (TPT/L) is a two-times concentrated version of the Phyzyme XP 5000. (Ex. 12 at 4; Ex. 13 at 3.)

68. For example, the characteristics of the recipient or parental micro-organism are that the recipient strain is the heterologous yeast *Schizosaccharomyces pombe* ATCC 38399, a teleomorph heterothallic leucine auxotrophic yeast strain. (Ex. 11 at 5.) The expression cassette, which consists of the cytomegalovirus promotor, the 5' untranslated region of the human lipocortin1 cDNA, the 6-phytase ORF, the terminator and the 3' untranslated region of the gene encoding human lipoprotein1, was religated so that eight expression cassettes were constructed as tandem repeats. The eight tandem expression cassettes were digested from the plasmid and the linearised DNA fragment separated from the plasmid fragment encoding ampicillin resistance. They were then transferred into *S. pombe* in two round of gene replacement recombination using auxotrophic mutants and selection for prototrophy. Phyzyme XP is produced by a contained system of submerged, fed-batch pure culture fermentation of the genetically modified strain *S. pombe*. (Ex. 10 at 6.)

69. In another example, the Phyzyme XP 10000 TPT of Exhibit 14 was manufactured by Genencor in Finland in a heterologous yeast host *Schizosaccharomyces pombe*. (Ex. 9 at 5-6; Ex. 14 at 1-2.)

70. In another example, the packaging label of an order of Phyzyme XP 10000 TPT acquired in the United States by Huvepharma demonstrates that Phyzyme XP 10000 TPT was manufactured in Finland and sold by Genencor. (Ex. 8 at 1.) Analytical testing of the Phyzyme XP 10000 TPT sample in Exhibit 8 by Plaintiffs confirmed that the sample contained a yeast. In another example, a Phyzyme XP 10000 TPT phytase sample acquired by Huvepharma in Belgium was manufactured by Genencor in Finland Ex. (Ex. 14 at 1-7.) Analytical testing of the Phyzyme XP 10000 TPT sample in Exhibit 8 by Plaintiffs confirmed that the sample contained a yeast.

71. Each use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States is a use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States that was produced by isolating the expressed protein or polypeptide.

72. For example, Genencor operates biorefineries that isolates expressed proteins or polypeptides. (Ex. 9 at 8.) The production process for Phyzyme XP includes the technique used to remove microbial cells from the product. A number of process steps serve to prevent the presence of the production organism in the final product. In the cell separation step, using centrifugation or rotary vacuum filtration, the majority of yeast cells (i.e., >95%) are removed. In the clarification step, either conventional (depth) filtration or tangential flow microfiltration ensures that a cell-free process stream is provided for the ultrafiltration step. The polish filtration step is an additional conventional (depth) filtration or tangential flow microfiltration step, which further ensures that no production organism is present in the final product. (Ex. 10 at 6.)

73. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States is a use, offer for sale, and/or sale of Phyzyme

phytase products imported into the United States that was produced and/or is being produced by a method wherein said protein or polypeptide catalyzes the release of phosphate from phytate.

74. For example, Phyzyme XP has an exceptionally high relative activity at low pH levels compared to fungal phytases. It also has enhanced resistance to pepsin produced by the animal. This means it works quickly in the upper digestive tract to both release phosphorus and overcome phytate's anti-nutrient effects. (Ex. 7 at 2.)

75. For example, the FEEDAP Panel considers that the change in the formulation (of Phyzyme XP 10000 L/TPT) will not affect the phytase activity of the additive in the gastrointestinal tract and therefore the conclusions reached in the previous opinion (relating to Phyzyme XP 5000 L/G). (Ex. 13 at 7.)

76. For example, Phyzyme XP for Pigs and Chickens is a phytase designed specifically to improve the availability of phosphorus, calcium and amino acids contained in cereal grains, oil seed meals and their by-products. (Ex. 15 at 1.)

77. For example, a Phyzyme XP 10000 TPT product insert states the product is phytase feed enzyme specifically developed to increase the digestibility of phytin-bound phosphorus, calcium, energy and amino acids in poultry and pig diets. (Ex. 14 at 2.)

78. In a further example, Phyzyme XP is intended to be used as an additive to increase the bioavailability of phosphorus from the diet by hydrolysing the plant phytate. This would reduce the need to add inorganic phosphorus supplements to the animal diets and would decrease the excretion of total phosphorus in manure. (Ex. 10 at 5.)

79. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States is a use, offer for sale, and/or sale of Phyzyme

phytase products imported into the United States that was produced and/or is being produced by a method wherein said protein or polypeptide catalyzes the release of phosphate from phytate.

80. For example, Phyzyme XP has an exceptionally high relative activity at low pH levels compared to fungal phytases. It also has enhanced resistance to pepsin produced by the animal. This means it works quickly in the upper digestive tract to both release phosphorus and overcome phytate's anti-nutrient effects. (Ex. 7 at 2.)

81. In a further example, Phyzyme XP is intended to be used as an additive to increase the bioavailability of phosphorus from the diet by hydrolysing the plant phytate. This would reduce the need to add inorganic phosphorus supplements to the animal diets and would decrease the excretion of total phosphorus in the manure. (Ex. 10 at 5.)

82. For example, the FEEDAP Panel (The Panel on Additives and Products or Substances used in Animal Feed) considers that the change in the formulation (of Phyzyme XP 10000 L/TPT) will not affect the phytase activity of the additive in the gastrointestinal tract and therefore the conclusions reached in the previous opinion (relating to Phyzyme XP 5000 L/G). (Ex. 13 at 7.)

83. For example, Phyzyme XP for Pigs and Chickens is a phytase designed specifically to improve the availability of phosphorus, calcium and amino acids contained in cereal grains, oil seed meals and their by-products. (Ex. 15 at 1.)

84. For example, a Phyzyme XP 10000 TPT product insert states the product is phytase feed enzyme specifically developed to increase the digestibility of phytin-bound phosphorus, calcium, energy and amino acids in poultry and pig diets. (Ex. 14 at 2.)

85. Upon information and belief, each use, offer for sale, and/or sale of Phyzyme phytase products imported into the United States is a use, offer for sale, and/or sale of Phyzyme

phytase products imported into the United States that was produced and/or is being produced by a method that provides increased thermostability as compared to that of said protein or polypeptide expressed in a non-yeast host cell.

86. For example, Phyzyme XP TPT has “unrivalled heat stability, superior performance,” and “in a series of trials conducted at the Technological Institute, Kolding, Denmark, Phyzyme XP TPT is shown to be more heat stable than other leading phytase products.” (Ex. 17 at 1-2.)

87. For example, significant loss of phytase activity during steam conditioning and subsequent pelleting of feed negatively impacts profitability. Phyzyme XP incorporates unique TPT coating technology, which offers heat stability up to 95°C (203°F). The TPT coating also allows rapid release of phytase in the upper part of the gut to achieve optimum bio-efficacy. (Ex. 16 at 2.)

88. For example, Phyzyme XP 5000L is also stable after mixing with feedingstuffs with approximately 80% of activity remaining after six months storage in a feed mash at both 20°C and 35°C. Following pelleting of feeds at 80C, 82% of the initial phytase activity was still present, thus Phyzyme XP 5000G is considered to be stable when pelleted up to this temperature. (Ex. 11 at 5.)

89. For example, Phyzyme XP 10000 TPT stability in pelleting, when tested with a maize-based diet and was conditioned for 30 seconds at 90°C or 95°C and pelleted, resulted in a percentage of recovery of the initial enzymatic activity of 99% and 96%, respectively. It is not expected that the double concentration of the Phyzyme XP 10000 L enzyme (compared to Phyzyme XP 5000L) will modify the stability of the product in feedingstuffs. Ex. Phyzyme XP

5000 showed an 80% of the activity remaining when added to feedingstuffs and stored for six months at 20°C and 35°C. 13 at 7.

90. For example, Phyzyme XP is a phytase protected by unique Thermal Protection Technology coating from Danisco Animal Nutrition. Phyzyme XP TPT is heat stable to 95°C/203°F during pelleting, and Phyzyme XP G should not exceed conditioning and pelleting temperatures of 70°C/158°F. (Ex. 7 at 3-4.)

**COUNT I**  
**(Infringement of U.S. Patent No. 7,026,150)**

91. Plaintiffs repeat and re-allege each and every allegation contained in the preceding paragraphs of this Complaint as if stated in their entirety herein, and incorporate them herein by reference.

92. On April 11, 2006, the United States Patent and Trademark Office duly and legally issued the '150 Patent, entitled "Overexpression of Phytase Genes in Yeast Systems," to inventor Xingen Lei. The '150 Patent was assigned at issuance to Cornell Research Foundation, Inc., Ithaca, New York. Cornell Research Foundation, Inc. is the owner of the '150 patent by virtue of an assignment, which was duly recorded at the United States Patent and Trademark Office at Reel 013294 and Frame 0133, and continues to be the owner of the '150 Patent. (Ex. 3.)

93. Pursuant to an agreement entered into with Cornell Research Foundation, Inc., Huvepharma obtained an exclusive license to the '150 Patent and has the right to sue for infringement of that patent and to recover damages for such infringement.

94. Upon information and belief, Defendants have infringed and continue to infringe at least claims 1-4, 6-7, 16, 29, and 31-33 of the '150 Patent pursuant to 35 U.S.C. § 271(g),

literally or under the doctrine of equivalents, at least by importing into the United States, offering to sell, selling, and/or using without authority Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

95. Upon information and belief, Defendants have infringed and continue to infringe at least claims 1-4, 6-7, 16, 29, and 31-33 of the '150 Patent pursuant to 35 U.S.C. § 271(g), literally or under the doctrine of equivalents, by offering to sell, selling, and/or using within the United States without authority Phyzyme phytase products, including but not limited to Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT, which were imported into the United States.

96. Upon information and belief, the Phyzyme phytase products are produced using the same methods in the context of the '150 Patent claims. Thus, the evidence and descriptions herein describing the method of producing Phyzyme XP is applicable to any one or more of the other Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

97. As an example, Exhibit 4 is a preliminary and exemplary claim chart detailing Defendants' infringement of claims 1-4, 6-7, 16, 29, and 31-33 of the '150 Patent. This chart is not intended to limit Huvepharma's right to modify the chart or allege that other products and/or

activities of Defendants infringe the identified claims or any other claims of the '150 patent or any other patent. Exhibit 4 is hereby incorporated by reference in its entirety. Each claim element in Exhibit 4 that is mapped to the accused Phyzyme phytase products, including Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT, shall be considered an allegation within the meaning of the Federal Rules of Civil Procedure and therefore a response to each allegation is required.

98. Defendants' infringement of the '150 Patent has injured Plaintiffs in their business and property rights. Plaintiffs are entitled to recover monetary damages based on the injuries arising from Defendants' infringement pursuant to 35 U.S.C. § 284 in an amount to be determined at trial.

**COUNT II**  
**(Infringement of U.S. Patent No. 7,312,063)**

99. Plaintiffs repeat and re-allege each and every allegation contained in the preceding paragraphs of this Complaint as if stated in their entirety herein, and incorporate them herein by reference.

100. On December 25, 2007, the United States Patent and Trademark Office duly and legally issued the '063 Patent, entitled "Overexpression of Phytase Genes in Yeast Systems," to inventor Xingen Lei. The '063 Patent was assigned at issuance to Cornell Research Foundation, Inc., Ithaca, New York. Cornell Research Foundation, Inc. is the owner of the '063 patent by virtue of an assignment that was duly recorded at the United States Patent and Trademark Office at Reel 009457 and Frame 0350, and continues to be the owner of the '063 Patent.

101. Pursuant to an agreement entered into with Cornell Research Foundation, Inc., Huvepharma obtained an exclusive license to the '063 Patent and has the right to sue for infringement of that patent and recover damages for such infringement.

102. Upon information and belief, defendants have infringed and continue to infringe at least claims 1-2 and 5-7 of the '063 Patent pursuant to 35 U.S.C. § 271(g), literally or under the doctrine of equivalents, at least by importing into the United States, offering to sell, selling, and/or using without authority Phyzyme phytase products, including at least Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

103. Upon information and belief, Defendants have infringed and continue to infringe at least claims 1-2 and 5-7 of the '063 Patent pursuant to 35 U.S.C. § 271(g), literally or under the doctrine of equivalents, by offering to sell, selling, and/or using within the United States without authority Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT, which were imported into the United States.

104. Upon information and belief, the Phyzyme phytase products are produced using the same methods in the context of the '063 Patent claims. Thus, the evidence and descriptions herein describing the method of producing Phyzyme XP is applicable to any one or more of the other Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G,

Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

105. As an example, Exhibit 5 is a preliminary and exemplary claim chart detailing Defendants' infringement of claims 1-2 and 5-7 of the '063 Patent. This chart is not intended to limit Huvepharma's right to modify the chart or allege that other products and/or activities of Defendants' infringe the above identified claims or any other claims of the '063 patent or any other patent. Exhibit 5 is hereby incorporated by reference in its entirety. Each claim element in Exhibit 5 that is mapped to the accused Phyzyme phytase products, including Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT, shall be considered an allegation within the meaning of the Federal Rules of Civil Procedure and therefore a response to each allegation is required.

106. Defendants' infringement of the '063 Patent has injured Plaintiffs in their business and property rights. Plaintiffs are entitled to recover monetary damages based on the injuries arising from Defendants' infringement pursuant to 35 U.S.C. § 284 in an amount to be determined at trial.

**COUNT III**  
**(Infringement of U.S. Patent No. 8,455,232)**

107. Plaintiffs repeat and re-allege each and every allegation contained in the preceding paragraphs of this Complaint as if stated in their entirety herein, and incorporate them herein by reference.

108. On June 4, 2013, the United States Patent and Trademark Office duly and legally issued the '232 Patent, entitled "Overexpression of Phytase Genes in Yeast Systems," to inventor Xingen Lei. The '232 Patent was assigned at issuance to Cornell Research Foundation, Inc.,

Ithaca, New York. Cornell Research Foundation, Inc. is the owner of the '232 Patent by virtue of an assignment that was duly recorded at the United States Patent and Trademark Office at Reel 009457 and Frame 0350, continues to be the owner of the '232 Patent. (Ex. 6.)

109. Pursuant to an agreement entered into with Cornell Research Foundation, Inc., Huvepharma obtained an exclusive license to the '232 Patent and has the right to sue for infringement of that patent and recover damages for such infringement.

110. Upon information and belief, Defendants have infringed and continue to infringe at least claims 1-2 of the '232 Patent pursuant to 35 U.S.C. § 271(g), literally or under the doctrine of equivalents, at least by importing into the United States, offering to sell, selling, and/or using without authority Phyzyme phytase products, including but not limited to at least Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

111. Upon information and belief, Defendants have infringed and continue to infringe at least claims 1-2 of the '232 Patent pursuant to 35 U.S.C. § 271(g), literally or under the doctrine of equivalents, by offering to sell, selling, and/or using within the United States without authority Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT, which were imported into the United States.

112. Upon information and belief, the Phyzyme phytase products are produced using the same methods in the context of the '232 Patent claims. Thus, the evidence and descriptions herein describing the method of producing Phyzyme XP is applicable to any one or more of the

other Phyzyme phytase products, including but not limited to Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT.

113. As an example, Exhibit 6 is a preliminary and exemplary claim chart detailing Defendants' infringement of claims 1-2 of the '232 Patent. This chart is not intended to limit Huvepharma's right to modify the chart or allege that other products and/or activities of Defendants infringe the above identified claims or any other claims of the '232 Patent or any other patent. Exhibit 6 is hereby incorporated by reference in its entirety. Each claim element in Exhibit 6 that is mapped to the accused Phyzyme phytase products, including Phyzyme XP, Phyzyme XP TPT, Phyzyme XP G, Phyzyme R, Phyzyme XP Liquid, Phyzyme XP 1500, Phyzyme XP 5000G, Phyzyme XP 5000L, Phyzyme XP 10000L, Phyzyme XP 150000L, and/or Phyzyme XP 10000TPT shall be considered an allegation within the meaning of the Federal Rules of Civil Procedure and therefore a response to each allegation is required.

114. Defendants' infringement of the '232 Patent has injured Plaintiffs in their business and property rights. Plaintiffs are entitled to recover monetary damages based on the injuries arising from Defendants' infringement pursuant to 35 U.S.C. § 284 in an amount to be determined at trial.

### **PRAYER FOR RELIEF**

WHEREFORE, Plaintiffs pray for relief as follows:

- A. Judgment that Defendants have infringed one or more claims of the '150 Patent, the '063 Patent, and/or the '232 Patent;
- B. An award of damages pursuant to 35 U.S.C. § 284;

C. Judgment that Defendants' acts were willful;

D. An award to Plaintiffs of their costs and reasonable expenses to the fullest extent permitted by law; and

E. An award of such other and further relief as the Court may deem just and proper.

**DEMAND FOR JURY TRIAL**

Pursuant to Federal Rule of Civil Procedure 38(b), Plaintiff demands trial by jury on all issues so triable.

June 20, 2018

OF COUNSEL:

Ajit Vaidya  
Ken Sheets  
KENEALY VAIDYA LLP  
3000 K. Street, NW  
Suite 200  
Washington, DC 20007  
(202) 748-5902

BAYARD, P.A.

/s/ Stephen B. Brauerman  
Stephen B. Brauerman (No. 4952)  
Sara E. Bussiere (No. 5398)  
600 N. King Street, Suite 400  
P.O. Box 25130  
Wilmington, DE 19899  
Tel.: (302) 655-500  
Fax: (302) 658-6395  
sbrauerman@bayardlaw.com  
sbussiere@bayardlaw.com

*Attorneys for Plaintiffs*