

United States Court of Appeals for the Federal Circuit

2008-1228, -1252

ECOLAB, INC.,

Plaintiff-Appellant,

v.

FMC CORPORATION,

Defendant-Cross Appellant.

Thomas L. Hamlin, Robins, Kaplan, Miller & Ciresi L.L.P., of Minneapolis, Minnesota, argued for plaintiff-appellant. With him on the brief were Stephen P. Safranski and Heather M. McElroy.

Rudolf E. Hutz, Connolly Bove Lodge & Hutz LLP, of Wilmington, Delaware, argued for defendant-cross appellant. With him on the brief was Francis DiGiovanni. Of counsel was Steven A. Nash. Of counsel on the brief was Alan M. Anderson, Briggs and Morgan, P.A., of Minneapolis, Minnesota.

Appealed from: United States District Court for the District of Minnesota

Judge James M. Rosenbaum

United States Court of Appeals for the Federal Circuit

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ECOLAB, INC.,

Plaintiff-Appellant,

v.

FMC CORPORATION,

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Appeals from the United States District Court for the District of Minnesota in case no. 05-CV-831, Judge James M. Rosenbaum.

DECIDED: June 9, 2009

Before RADER, GAJARSA, and DYK, Circuit Judges.

GAJARSA, Circuit Judge.

In this patent infringement case, Ecolab, Inc. appeals and FMC Corporation cross appeals from the final judgment of the United States District Court for the District of Minnesota, which was based on the jury's verdict that: Ecolab infringed specified claims of FMC's U.S. Patent No. 5,632,676 ("the '676 patent"); FMC willfully infringed specified claims of two patents asserted by Ecolab—U.S. Patent Nos. 6,010,729 ("the '729 patent") and 6,113,963 ("the '963 patent"); and specified claims of each patent asserted by Ecolab are invalid as anticipated or obvious. We find no error regarding the

majority of issues presented on appeal. However, we hold the district court erred by denying FMC's motions for judgment as a matter of law ("JMOL") that claim 7 of the '729 patent and claims 25–28 of the '963 patent are invalid, by failing to conduct the proper analysis when considering the permanent injunction motions, and by failing to award interest. Thus, we affirm-in-part, reverse-in-part, vacate-in-part, and remand for further proceedings consistent with this opinion.

Background

I. The Technology and Patents

Ecolab and FMC sell chemical products used by beef and poultry processors to reduce pathogens, such as *E. coli* and salmonella, on uncooked beef and poultry. Ecolab sells Inspexx, with Inspexx 100 marketed for use on poultry and Inspexx 200 marketed for use on beef. FMC sells FMC-323, which is used on either beef or poultry. The Inspexx and FMC-323 products contain the antimicrobial compound peracetic acid ("PAA"), which the food processing and food service industries have long used as a surface sanitizer. Additionally, the Inspexx products contain peroctanoic acid and octanoic acid, whereas FMC-323 does not.

Both Ecolab and FMC have obtained patents directed to the use of PAA as a sanitizer in beef and poultry processing. In April 1993, Ecolab obtained U.S. Patent No. 5,200,189 ("the Oakes patent"), which was not asserted in this case but is relevant prior art. That patent claims a peroxyacid antimicrobial composition containing peracetic, peroctanoic, and octanoic acids. According to the Oakes patent, the combination of the three acids "produces a synergistic effect, producing a much more potent biocide than can be obtained by using these components separately." Oakes Patent col.2 ll.51–53. The patent states that the claimed sanitizing solution "can be used effectively to clean or

sanitize facilities and equipment used in the food processing, food service and health care industries.” Id. at col.2 ll.56–59. In October 1993, FMC submitted a patent application that disclosed a method for sanitizing meat, specifically processed fowl, by applying PAA directly to the meat. That patent application issued as the '676 patent in 1997. The patent described the invention as “an extremely effective method for sanitizing a fowl carcass without unduly affecting the skin or the flesh of the bird carcass.” '676 Patent col.2 ll.60–62. In 1998 and 1999, Ecolab filed three patent applications directed to methods for applying PAA alone or in combination with other peracids directly to meat products, including beef or poultry, to reduce microbial populations on the meat surface. Those applications issued in 2000 as the '729 patent, the '963 patent, and U.S. Patent No. 6,103,286 (“the '286 patent”).

II. The Proceedings before the District Court

Ecolab filed an action against FMC for infringement of the '729, '286, and '963 patents. FMC counterclaimed that Ecolab infringed FMC's '676 patent, and each party asserted its opponent's patent claims are invalid. The case was tried before a jury, and the jury found that: (1) claims 17, 19, 20, and 22 of Ecolab's '729 patent are invalid as anticipated or obvious; (2) claims 1–4 of Ecolab's '286 patent are invalid as obvious; (3) claims 7, 17, 19, 20, and 22 of Ecolab's '963 patent are invalid as anticipated or obvious; (4) the '676 patent claims asserted by FMC are not invalid; (5) FMC willfully infringed claim 7 of the '729 patent and claims 25, 27, and 28 of the '963 patent; (6) Ecolab infringed claims 1, 5, 6, and 7 of FMC's '676 patent; and (7) neither party induced infringement of any claims. The jury awarded reasonable royalty damages to both parties, and the district court entered judgment on the jury's verdict.

Both Ecolab and FMC filed post-trial motions. Ecolab filed motions for JMOL, a permanent injunction, enhanced damages, attorney fees, prejudgment and post-judgment interest, an accounting, and amendment of the judgment. FMC filed various JMOL and new trial motions and a motion to alter the judgment that included a request for a permanent injunction, prejudgment and post-judgment interest, and an accounting. The district court denied all post-trial motions in summary form and without explanation. Order, Ecolab, Inc. v. FMC Corp., No. 05-CV-831 (D. Minn. Feb. 22, 2008). Ecolab and FMC timely appealed to this court. We have jurisdiction pursuant to 28 U.S.C. § 1295(a)(1).

Discussion

Ecolab appeals and FMC cross appeals the district court's denial of their respective JMOL motions. Ecolab further asserts the district court erred by denying its motions for a permanent injunction, enhanced damages, attorney fees, interest, and an accounting. FMC further asserts the district court erred by misconstruing a claim term, by imposing an improper damages award, and by denying its requests for a permanent injunction, prejudgment interest, and an accounting.

I. The JMOL Motions

Both Ecolab and FMC assert that the district court erred by denying their respective JMOL motions. Specifically, Ecolab contends the district court should have granted JMOL that Ecolab did not infringe the '676 patent claims and that FMC induced infringement of Ecolab's patent claims. FMC contends the district court should have granted JMOL that claim 7 of the '729 patent and claims 25–28 of the '963 patent are invalid as anticipated or obvious, that Ecolab induced infringement of FMC's patent claims, and that FMC did not willfully infringe Ecolab's patent claims.

A. Standard of Review

This court applies the procedural law of the relevant regional circuit when reviewing the district court's denial of a motion for JMOL. MicroStrategy Inc. v. Bus. Objects, S.A., 429 F.3d 1344, 1348 (Fed. Cir. 2005). Under Eighth Circuit law, “[w]e review de novo the denial of a motion for judgment as a matter of law, using the same standards as the district court.” Concord Boat Corp. v. Brunswick Corp., 207 F.3d 1039, 1049 (8th Cir. 2000). We “must assume as proven all facts that the nonmoving party’s evidence tended to show, give [the nonmovant] the benefit of all reasonable inferences, and assume that all conflicts in the evidence were resolved in [the nonmovant’s] favor.” Hathaway v. Runyon, 132 F.3d 1214, 1220 (8th Cir. 1997). We must consider all the evidence, without weighing witness credibility, and if the only reasonable conclusion is not the one reached by the jury, JMOL is appropriate and should have been granted. See Concord Boat Corp., 207 F.3d at 1050.

B. Ecolab’s Motion for JMOL of Noninfringement

The jury found Ecolab infringed claims 1, 5, 6, and 7 of FMC’s ’676 patent, all of which include the following:

A method for sanitizing fowl that has been killed, plucked and eviscerated, comprising contacting the fowl with an aqueous peracetic acid solution, which consists essentially of a sanitizing concentration of at least a 100 ppm peracetic acid . . . and maintaining that contact for a time sufficient to sanitize the fowl without adversely affecting the fowl.

’676 Patent col.10 ll.15–48. Ecolab argues it is entitled to JMOL of noninfringement for two reasons. First, Ecolab argues that when the ’676 patent claims are properly construed in light of FMC’s prosecution history disclaimer, Inspexx does not infringe because the patent claims cover only solutions containing PAA as the sole antimicrobial

agent. Second, Ecolab argues it does not infringe because Inspexx does not “sanitize” meat products under the patent’s definition of that term. We find neither argument persuasive and hold that the district court did not err when it denied Ecolab’s motion for JMOL of noninfringement.

1. Prosecution History Disclaimer

Ecolab first argues that, during prosecution, FMC disclaimed compositions containing multiple antimicrobial agents. Thus, because Inspexx contains three antimicrobial agents, Ecolab argues that Inspexx does not infringe the ’676 patent as a matter of law. Whether prosecution history disclaimer applies is a legal question this court reviews de novo. Cybor Corp. v. FAS Techs., 138 F.3d 1448, 1456 (Fed. Cir. 1998) (en banc). As this court has noted, “since, by distinguishing the claimed invention over the prior art, an applicant is indicating what the claims do not cover, he is by implication surrendering such protection.” Ekchian v. Home Depot, Inc., 104 F.3d 1299, 1304 (Fed. Cir. 1997). However, we will find that the applicant disclaimed protection during prosecution only if the allegedly disclaiming statements constitute “a clear and unmistakable surrender of subject matter.” Bayer AG v. Elan Pharm. Research Corp., 212 F.3d 1241, 1251 (Fed. Cir. 2000). Even if an isolated statement appears to disclaim subject matter, the prosecution history as a whole may demonstrate that the patentee committed no clear and unmistakable disclaimer. Elbex Video, Ltd. v. Sensormatic Elecs. Corp., 508 F.3d 1366, 1372–73 (Fed. Cir. 2007).

FMC contends the district court did not err when it declined to apply prosecution history disclaimer because its prosecution statements cannot reasonably be interpreted as disclaimers when they are properly read in the context of the entire patent disclosure and prosecution history. In addition, FMC argues that because the ’676 patent claims

cover the use of products that “consist essentially of” PAA, ’676 Patent col.10 ll.15–51, the district court properly determined that the claims encompass products that contain PAA in combination with other antimicrobial agents. We agree with FMC.

In the first office action issued by the United States Patent and Trademark Office, the Examiner rejected all claims as anticipated by U.S. Patent No. 5,208,057 (“the Greenley patent”) and as obvious in light of the combination of the Greenley and Oakes patents. FMC responded to those rejections by arguing, inter alia, that its invention uses sanitizing solutions containing PAA as the only antimicrobial agent. In particular, FMC stated: “The peracetic acid is the sole antimicrobial agent in the sanitizing solution.” Amendment and Remarks at 2, U.S. Patent Appl. Ser. No. 08/134,995 (Oct. 6, 1994) (emphasis added). To distinguish the Greenley patent, FMC stated: “Greenley et al. do not teach the use of peracetic acid alone as a sanitizer.” *Id.* at 3 (emphasis added). To distinguish the Oakes patent, FMC stated: “Oakes et al. appears to be strongly advocating and teaching the use of mixtures of biocides, not the use of a single biocide.” *Id.* at 3 (emphasis added).

In response to those statements, the Examiner noted that the claims are directed to the use of a composition “which consists essentially of” PAA and are thus not limited to compositions containing PAA as the sole antimicrobial agent. Examiner’s Action at 2, U.S. Patent Appl. Ser. No. 08/134,995 (Mar. 1, 1995) (“[I]t should be noted that the terminology ‘consisting essentially’ does not mean that Applicants’ sanitizing solution is consisted ‘solely’ of a peracetic acid solution.”). Following the Examiner’s clarification, FMC never repeated the allegedly disclaiming statements and instead offered alternative reasons to overcome the Greenley and Oakes prior art. The

Examiner eventually allowed the claims over the cited prior art, without any change to the claims' "consists essentially of" language. For these reasons, a reasonable reader of this prosecution history could conclude that FMC's initial statements that PAA is the sole antimicrobial agent used in its claimed method were hyperbolic or erroneous, that the Examiner corrected FMC's error in the following communication, that FMC recognized its error and never again repeated or relied upon the erroneous rationale, and that the claims were allowed for reasons independent of the allegedly disclaiming statements. Thus, when FMC's statements are considered in the context of the prosecution history as a whole, they simply are not clear and unmistakable enough to invoke the doctrine of prosecution history disclaimer.

Ecolab argues that FMC cannot rely on the claims' "consists essentially of" language because the '676 patent disclosure and prosecution history clearly altered the meaning of that language. While "consisting essentially of" usually "signals that the invention necessarily includes the listed ingredients and is open to unlisted ingredients that do not materially affect the basic and novel properties of the invention," PPG Indus. v. Guardian Indus. Corp., 156 F.3d 1351, 1354 (Fed. Cir. 1998), Ecolab correctly notes that a patentee can alter that typical meaning, see id. at 1355 (stating that a patent applicant "could have defined the scope of the phrase 'consisting essentially of' for purposes of its patent by making clear in its specification what it regarded as constituting a material change in the basic and novel characteristics of the invention"); see also Water Techs. Corp. v. Calco, Ltd., 850 F.2d 660, 666 (Fed. Cir. 1988) (looking to the prosecution history to determine if a specified ingredient was excluded from a "consisting essentially of" claim). Specifically, Ecolab argues that the '676 patent clearly

limits the claim scope to compositions containing PAA as the sole antimicrobial agent because all the examples in the '676 patent use PAA as the only antimicrobial agent. We find that argument unpersuasive. The patent examples describe compositions that contain agents other than PAA, such as hydrogen peroxide, acetic acid, or sulfuric acid. See, e.g., '676 Patent col.2 ll.27–31, col.4 ll.13–14, col.5 ll.13–14. Although the '676 patent does not explicitly identify hydrogen peroxide, acetic acid, or sulfuric acid as an antimicrobial agent, evidence of record indicates that an ordinarily skilled artisan reading the patent would understand that those components are considered antimicrobial agents. See J.A. at 6051 (testimony describing hydrogen peroxide as an “antimicrobial”); U.S. Patent No. 3,934,044 col.2 ll.46–55 (filed Dec. 6, 1974) (describing the antibacterial effect of acetic acid on a meat surface); U.S. Patent No. 5,436,008 col.6 ll.20–34 (filed Aug. 5, 1993) (describing the “antimicrobial character” of sulfur compounds such as sulfuric acid). Thus, the '676 patent disclosure does not limit the claims to the use of compositions containing PAA as the sole antimicrobial agent; it covers the use of compositions consisting essentially of PAA.

Because FMC has neither altered the typical meaning of “consists essentially of” nor clearly disclaimed compositions containing multiple antimicrobial agents, the district court did not err when it denied Ecolab’s JMOL motion.

2. Construction of “Sanitize”

The '676 patent claims are directed to a “method for sanitizing fowl,” '676 Patent col.10 l.15, and the patent explicitly states that the term “sanitize” “denote[s] a bacterial population reduction to a level that is safe for human handling and consumption,” id. at col.2 ll.10–12. Thus, Ecolab argues that Inspexx cannot infringe the '676 patent claims because it does not and cannot make raw poultry safe for human consumption; cooking

is required. The district court instructed the jury that, in the context of the '676 patent, the “sanitized” meat was not necessarily safe for human consumption immediately after treatment with PAA; the “sanitized” meat was not safe for consumption until it was cooked. Thus, Ecolab argues that “[b]y incorporating a subsequent ‘cooking’ element into the term ‘sanitize,’ the district court overrode the express definition of ‘sanitize’ set forth in the '676 patent.” Appellant’s Br. at 41. We review the district court’s claim construction determination de novo, Cybor Corp., 138 F.3d at 1456, and we find Ecolab’s argument unpersuasive.

It is well-settled that an inventor may act as his own lexicographer to define a patent term, Phillips v. AWH Corp., 415 F.3d 1303, 1316 (Fed. Cir. 2005) (en banc), as FMC clearly chose to do here—notably failing to state that the invention can make poultry safe for consumption only after it is cooked. It is likewise well-settled that courts generally may not re-draft claims; we must construe the claims as written. Chef Am., Inc. v. Lamb-Weston, Inc., 358 F.3d 1371, 1374 (Fed. Cir. 2004). Ecolab relies heavily on Chef America in asserting that the district court erred when it construed “sanitize.” In that case, the claim at issue regarded a method for baking cookies and required “heating the resulting batter-coated dough to a temperature in the range of about 400° F. to 850° F.” Id. Clearly, the patentee meant that the user should set the oven so as to heat the dough at 400–850°, rather than to 400–850°; otherwise, the dough would be burned to a crisp and the claims would be nonsensical. Still, this court held that “in accord with our settled practice we construe the claim as written, not as the patentees wish they had written it. As written, the claim unambiguously requires that the dough be heated to a temperature range of 400° F. to 850° F.” Id. (emphasis added).

Because the claim language at issue in Chef America was unambiguous, that case is distinguishable from the present case. In the present case, the definition of “sanitize” is ambiguous in that it does not indicate when consumption is to take place—the definition does not indicate whether the consumption would occur immediately after application of PAA or, for example, at a later time after the meat is cooked. The testimony of Ecolab’s expert, Dr. Tompkin, helps to resolve that ambiguity, albeit in FMC’s favor. Specifically, Dr. Tompkin admitted that in-plant inspectors examine poultry that has been treated with PAA to determine if it is “fit for human consumption.” J.A. at 5785. Surely, the inspectors do not require the poultry to be “fit for human consumption” in its uncooked state. Thus, Chef America is distinguishable, and the district court did not err when it construed the term “sanitize” to mean that the treated meat has become safe for human handling and post-cooking consumption.

In summary, FMC did not, via an explicit or implicit disclaimer, limit the claims to the use of compositions containing PAA as the only antimicrobial agent, and FMC’s claims do not require that PAA-treated fowl be safe for immediate raw consumption. Thus, we affirm the district court’s denial of Ecolab’s motion for JMOL of noninfringement.

C. FMC’s Motion for JMOL of Invalidity

FMC moved for JMOL that claim 7 of the ’729 patent is invalid as anticipated or obvious and that claims 25–28 of the ’963 patent are invalid as obvious. For the following reasons, we reverse the district court’s denial of FMC’s motions.

1. Anticipation

FMC argues it is entitled to JMOL that claim 7 of the ’729 patent is invalid as anticipated by a prior art publication, J. Labadie et al., Development of a New

Technique for Obtaining Axenic Meat, 4 Eur. J. of Applied Microbiology 67 (1977) (“Labadie”). To anticipate claim 7, Labadie must explicitly or inherently disclose each and every limitation of the claim. See Advanced Display Sys., Inc. v. Kent State Univ., 212 F.3d 1272, 1282 (Fed. Cir. 2000); Celeritas Techs., Ltd. v. Rockwell Int’l Corp., 150 F.3d 1354, 1361 (Fed. Cir. 1998). Claim 7 is dependent on claim 1 and includes the following limitations:

A method of treating an animal carcass to reduce a microbial population in resulting cut meat, the method comprising the steps of: (a) applying to said carcass an antimicrobial composition comprising:

- (i) at least 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to 12 carbon atoms; and
- (ii) at least 20 ppm of one or more carboxylic acids having up to 18 carbon atoms;

wherein said composition is applied in an amount and time sufficient to reduce the microbial population.

... wherein the carcass is selected from a muscle meat including beef, pork, veal, buffalo or lamb.

'729 Patent col.23 ll.11–22 (the limitations in claim 1), col.23 ll.36–38 (the additional limitation in claim 7).

According to the special verdict form, the jury explicitly found that claim 7 of the '729 patent is not invalid as anticipated by Labadie. Because that is a factual finding, Advanced Display Sys., 212 F.3d at 1281, we will not overturn it so long as it is supported by substantial evidence in the record, United States v. Vertac Chem. Corp., 453 F.3d 1031, 1039 (8th Cir. 2006). We will “not substitute our judgment for that of the jury simply because there are other reasonable possibilities.” United States v. Wells,

721 F.2d 1160, 1162 (8th Cir. 1982). However, we cannot uphold the jury's verdict here because it is not supported by substantial evidence.

FMC bore the burden of demonstrating that claim 7 is anticipated. As we have explained:

Evidence of invalidity must be clear as well as convincing. Typically, testimony concerning anticipation must be testimony from one skilled in the art and must identify each claim element, state the witnesses' interpretation of the claim element, and explain in detail how each claim element is disclosed in the prior art reference.

Schumer v. Lab. Computer Sys., Inc., 308 F.3d 1304, 1315 (Fed. Cir. 2002). FMC met that burden here. Specifically, FMC presented expert testimony from Professor Russell that addressed each claim element and showed how each element was disclosed in Labadie.

Labadie states: "After immersion in a 3% solution of peracetic acid for 2 min, the surfaces of muscles obtained from pig, horse and cattle were shown to be completely decontaminated." Labadie at 67. Dr. Russell explained how that statement, along with other portions of the article, met all of the claim limitations. J.A. at 5958–59. He explained that Labadie disclosed "[a] method of treating an animal carcass to reduce a microbial population in resulting cut meat," '729 Patent col.23 ll.11–12, because it describes a method for sanitizing the surfaces of muscles obtained from animals. He explained that the Labadie method disclosed the application of PAA to the muscle surface by immersing the cut meat in a 3% PAA solution, which discloses the claim limitations requiring application to the animal carcass of "at least 2 ppm of one or more mono- or di-peroxycarboxylic acids having up to 12 carbon atoms," id. at col.23 ll.16–18. Dr. Russell further testified that the method described by Labadie disclosed the

limitation requiring “at least 20 ppm of one or more carboxylic acids having up to 18 carbon atoms,” id. at col.23 ll.19–20, because acetic acid is present in the specified concentration as an equilibrium solution with the PAA. Dr. Russell noted that the limitation requiring that “the carcass is selected from a muscle meat including beef, pork, veal, buffalo or lamb,” id. at col.23 ll.36–38, was disclosed in the Labadie publication because Labadie utilized muscles obtained from pig, horse, and cattle. Finally, Dr. Russell explained that the limitation requiring that the PAA be “applied in an amount and time sufficient to reduce the microbial population,” id. at col.23 ll.21–22, was disclosed by Labadie because the authors reported that the muscle surfaces were decontaminated as a result of the PAA treatment. Thus, FMC presented a strong prima facie case that claim 7 is invalid as anticipated by the Labadie publication.

Ecolab argues that despite Dr. Russell’s testimony, the jury could reasonably conclude that Labadie does not anticipate claim 7. First, Ecolab asserts the claimed method is distinct from Labadie because the claimed method is directed to “applying peracetic acid to beef [to] reduce microbial populations in the complex setting of a processing plant.” Appellant’s Reply Br. at 25. That argument is unpersuasive because claim 7 is written broadly and is not limited to PAA treatment in a meat processing plant.

Second, Ecolab asserts that it presented “voluminous evidence of undue experimentation” to the jury. Id. at 27. It is true that an anticipating prior art reference “must teach one of ordinary skill in the art to make or carry out the claimed invention without undue experimentation.” Minn. Mining & Mfg. Co. v. Chemque, Inc., 303 F.3d 1294, 1306 (Fed. Cir. 2002). However, from the evidence presented, the jury could not reasonably conclude that Ecolab’s evidence of undue experimentation overcame FMC’s

strong evidence of anticipation. First, Ecolab presented no evidence that any experimentation would be required to practice claim 7 using the PAA treatment step disclosed in Labadie. Moreover, a careful analysis of the evidence reveals that the experimentation upon which Ecolab relies employed PAA solutions that were far less concentrated than the 3% PAA solution used in the Labadie method. For example, experiments cited by Ecolab, J.A. at 5801, 5893–94, and working examples in Ecolab’s own ’729 patent, ’729 Patent col.13 ll.11–14, col.17 ll.18–22, used approximately 0.01–0.025% PAA. Considering that the antimicrobial properties of PAA have long been known, and considering that 0.01–0.025% PAA can effectively reduce the microbial population on meat, it is unreasonable to conclude that one would have to perform experimentation—much less undue experimentation—to use Labadie’s disclosed 3% PAA solution to reduce the microbial population on the surface of cut meat. Thus, the evidence Ecolab presented regarding the “extensive testing” required to develop its product, J.A. at 5715, is not sufficient to support the jury’s verdict.

Finally, Ecolab argues that its claimed method is distinct from the method disclosed in the Labadie publication because Labadie teaches that each of two PAA treatment steps is followed by a trimming step, wherein the PAA-treated surface of the meat is trimmed away and discarded. See Labadie at 68–69. Ecolab also notes that Labadie teaches the use of sterile conditions to practice the method. See id. Because the Labadie article reported the results of sterility tests performed after the meat was twice treated with PAA and the PAA-treated surface was twice trimmed away, id. at 69, Ecolab argues the jury reasonably concluded that Labadie did not disclose the required limitation that the PAA be “applied in an amount and time sufficient to reduce the

microbial population,” see '729 Patent col.23 ll.21–22. In other words, Ecolab argues the jury could reasonably conclude that Labadie does not disclose that the PAA treatment alone is sufficient to reduce the microbial population on a meat surface. We disagree.

First, the Labadie publication disclosed that muscle surfaces were decontaminated by PAA treatment before the trimming steps were performed, Labadie at 68 (“Decontamination of the muscle took place in an extemporaneously prepared (Fig.2) bath of peracetic acid (3%) connected to the sterile lock isolator 1. The muscle was immersed in the acid bath for 2 min. Subsequently, . . . the peripheral part [of the muscle] exposed to acid was cut away.” (emphasis added)), and before sterile conditions were imposed, id. at 67 (describing the disclosed method as “superficial decontamination of muscle tissue obtained from a carcass and its subsequent handling in sterile isolators” (emphasis added)). The fact that the Labadie method discloses additional trimming steps performed under sterile conditions cannot render claim 7 valid because Labadie discloses all of the claim 7 limitations.

Moreover, the only reasonable conclusion that can be drawn from the evidence presented to the jury is that Labadie’s immersion of cut meat into a 3% PAA solution for two minutes was, in the words of claim 7, “in an amount and time sufficient to reduce the microbial population.” '729 Patent col.23 ll.21–22. As discussed in the previous paragraph, the Labadie publication itself discloses that the meat surface was decontaminated by the PAA treatment prior to any subsequent trimming steps. Dr. Tompkin, Ecolab’s expert witness, agreed that the Labadie article teaches the use of a 3% PAA solution to kill bacteria on the surface of treated meat. J.A. at 5801 (agreeing

that the Labadie article discloses the use of PAA to achieve a “total kill” of surface bacteria and “teach[es] contacting the surface of these red meat articles with peracetic acid to kill bacteria”).¹ In addition, Ecolab’s ’729 patent taught treating meat with 0.01–0.025% PAA for thirty seconds to achieve a reduction in the microbial population, ’729 Patent col.13 ll.3–31, and no evidence before the jury suggested that treatment with 3% PAA for two minutes, as disclosed in the Labadie publication, would be insufficient to reduce the microbial population on a meat surface. Thus, in light of the evidence presented, no reasonable jury could conclude that Labadie’s disclosure of treatment with 3% PAA for two minutes is not “in an amount and time sufficient to reduce the microbial population.” See id. at col.23 ll.21–22.

Under well-established law, “[t]hat which would literally infringe if later in time anticipates if earlier than the date of invention.” Lewmar Marine, Inc. v. Bariant, Inc., 827 F.2d 744, 747 (Fed. Cir. 1987) (emphasis omitted). For the reasons discussed above, it is clear that if one were to now practice the PAA treatment step of the Labadie method, he would infringe Ecolab’s claim 7. The evidence cannot reasonably support a different conclusion. Thus, we reverse the district court’s denial of JMOL because the jury’s verdict is not supported by substantial evidence.

2. Obviousness

FMC moved for JMOL that claim 7 of the ’729 patent and claims 25–28 of the ’963 patent are invalid as obvious, and the district court denied that motion. We need not address FMC’s argument that claim 7 of the ’729 patent is invalid as obvious

¹ Dr. Tompkin did discuss his criticism that the 3% solution used by Labadie “would cause some denaturation at the surface of the meat.” J.A. at 5801. However, that distinction does not affect our anticipation analysis because Ecolab’s claim 7 contains no limitation requiring that the meat maintain its natural surface properties.

because we have already determined that claim 7 is invalid as anticipated. Regarding claims 25–28 of the '963 patent, we reverse the district court's denial of FMC's JMOL motion.

“When reviewing a district court's JMOL determination as to obviousness, this court reviews a jury's conclusions on obviousness, a question of law, without deference, and the underlying findings of fact, whether explicit or implicit within the verdict, for substantial evidence.” Dippin' Dots, Inc. v. Mosey, 476 F.3d 1337, 1343 (Fed. Cir. 2007) (internal quotation marks omitted). Those underlying factual findings “include the familiar Graham factors: the scope and content of the prior art, the differences between the prior art and the claims at issue, the level of ordinary skill in the pertinent art, and secondary considerations, otherwise known as objective indicia of nonobviousness.” Finisar Corp. v. DirecTV Group, Inc., 523 F.3d 1323, 1338–39 (Fed. Cir. 2008) (citing Graham v. John Deere Co., 383 U.S. 1, 17–18 (1966)). “[A] combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.” KSR Int'l Co. v. Teleflex Inc., 127 S. Ct. 1727, 1731 (2007).

FMC argues the district court erred by denying its motion for JMOL that claims 25–28 of the '963 patent are obvious over a combination of the '676 patent and other pieces of prior art, such as U.S. Patent No. 5,143,739 (“the Bender patent”). We agree. Claim 25 is directed to “a method of treating a meat product to reduce a microbial population in the meat product,” wherein the method comprises steps for treating meat, such as poultry, with a PAA composition under specified conditions. '963 Patent col.25 l.43–col.26 l.8. Claims 26–28 are dependent on claim 25. Id. at col.26 ll.9–16. The claims require specified temperature, spray pressure, and contact time limitations.

Id. at col.25 l.49 (“at a temperature of up to about 60° C”), col.25 l.48 (“at a pressure of at least 50 psi”), col.25 l.49–col.26 l.1 (“resulting in a contact time of at least 30 seconds”). FMC correctly notes that its ’676 prior art patent discloses the temperature and contact time limitations. ’676 Patent col.9 ll.47–49 (disclosing the preferred temperature for PAA treatment as 4°C–40°C), col.3 ll.42–43 (applying PAA for 0.5 minutes or more). The parties agree that the ’676 patent does not, however, disclose treatment of poultry with PAA at a particular spray pressure, and the parties primarily limit their dispute to whether Ecolab’s addition of the “at least 50 psi” pressure limitation in the ’963 patent claims would have been obvious.²

FMC’s ’676 prior art patent disclosed “rapidly spraying” PAA onto poultry in order to sanitize the poultry, but it did not disclose that such rapid spraying should be at 50 psi or greater. Id. at col.3 ll.34–37. However, Ecolab’s expert acknowledged that the advantages of spraying antimicrobial solutions onto meat at a pressure greater than 50 psi were known in the prior art. J.A. at 5796. Such advantages include ensuring sufficient contact between the antimicrobial solution and the bacteria on the meat surface and using the pressure to “vigorously wash” the meat surface. Bender Patent col.8 ll.14–35, col.9 ll.59–61. The Bender patent disclosed spraying an antibacterial

² Ecolab also argues the jury could have reasonably concluded that the prior art did not disclose “achieving at least a one log₁₀ reduction in the microbial population,” as required by claims 25–28. That argument is unpersuasive. The evidence established that one skilled in the art would have known how to vary the PAA concentration or other parameters in order to achieve the disclosed one log₁₀ reduction. J.A. at 5802. Such experimentation is routine and cannot render an otherwise obvious claim valid. See Pfizer, Inc. v. Apotex, Inc., 480 F.3d 1348, 1368 (Fed. Cir. 2007) (“The experimentation needed, then, to arrive at the subject matter claimed in the ’303 patent was nothing more than routine application of a well-known problem-solving strategy, and we conclude, the work of a skilled artisan, not of an inventor.” (internal citations, quotation marks, and brackets omitted)).

solution, specifically a trialkali orthophosphate treatment, onto poultry at a pressure of “20 to 150 psi to cause a spray of medium particle size to impact the inside and outside of the poultry with sufficient force for good cleaning.” Id. at col.6 ll.10–16, col.8 ll.14–19. Ecolab’s expert admitted that one skilled in the art would know how to adjust application parameters to determine the optimum parameters for a particular solution. The question then is whether it would have been obvious to combine the high pressure parameter disclosed in the Bender patent with the PAA methods disclosed in FMC’s ’676 patent. The answer is yes.

First, “there was an apparent reason to combine the known elements in the fashion claimed by the patent at issue.” See KSR, 127 S. Ct. at 1741. The advantages of spraying antimicrobial solutions onto meat at high pressure were known, and methods for sanitizing meat with PAA were known. There was an apparent reason to combine these known elements—namely to increase contact between the PAA and the bacteria on the meat surface and to use the pressure to wash additional bacteria off the meat surface during the PAA treatment. Second, the person of ordinary skill would have known how to make this combination; he could have used the mechanical high pressure sprayer disclosed in the Bender patent. See Bender Patent col.8 ll.15–19, col.8 ll.33–35. Because the Bender patent disclosed using high pressure to improve the effectiveness of an antimicrobial solution when sprayed onto meat, and because an ordinarily skilled artisan would have recognized the reasons for applying PAA using high pressure and would have known how to do so, Ecolab’s claims combining high pressure with other limitations disclosed in FMC’s patent are invalid as obvious. See KSR, 127 S. Ct. at 1740 (“[I]f a technique has been used to improve one device, and a person of

ordinary skill in the art would recognize that it would improve similar devices in the same way, using the technique is obvious unless its actual application is beyond his or her skill.”). Finally, the claims are invalid as obvious because the combination of the high pressure treatment disclosed in the Bender patent with the methods disclosed in FMC’s patent is merely the combination of familiar elements to yield predictable results. See id. at 1739 (“The combination of familiar elements according to known methods is likely to be obvious when it does no more than yield predictable results.”). Thus, we cannot uphold the jury’s verdict that claims 25–28 of the ’963 patent are nonobvious, and we reverse the district court’s denial of FMC’s JMOL motion.³

D. FMC’s Motion for JMOL of Induced Infringement

FMC moved for JMOL, asserting that Ecolab induced infringement of its patent claims. To prevail on an induced infringement claim, the patentee must establish “that the alleged infringer’s actions induced infringing acts and that he knew or should have known his actions would induce actual infringements.” DSU Med. Corp. v. JMS Co., 471 F.3d 1293, 1304 (Fed. Cir. 2006) (en banc in relevant part) (quoting Manville Sales Corp. v. Paramount Sys., Inc., 917 F.2d 544, 554 (Fed. Cir. 1990)). Here, substantial evidence supports the jury’s verdict that Ecolab did not induce infringement of the ’676 patent claims because the jury could have reasonably concluded that Ecolab lacked the required intent. See Kinetic Concepts, Inc. v. Blue Sky Med. Group, Inc., 554 F.3d 1010, 1024 (Fed. Cir. 2009) (holding substantial evidence of lack of intent supported the

³ Because we hold that claim 7 of the ’729 patent and claims 25–28 of the ’963 patent are invalid as a matter of law, we need not consider several other arguments raised on appeal—e.g. FMC’s argument that the district court misconstrued the “muscle meat” term in claim 7 of the ’729 patent and the parties’ arguments regarding willful infringement or induced infringement of claim 7 of the ’729 patent and claims 25, 27, and 28 of the ’963 patent.

jury's verdict of no induced infringement). Thus, we affirm the district court's denial of JMOL.

Ecolab presented evidence from which the jury could have reasonably concluded that Ecolab personnel reasonably believed that FMC's '676 patent claims did not cover the use of Inspexx. For example, Dr. Cords testified regarding the three antimicrobial components of Inspexx, the synergistic effect achieved by that combination, and the fact that the Oakes patent—which was prior art against the '676 patent—disclosed that same combination of antimicrobial agents. From that testimony, the jury could have reasonably concluded that Ecolab lacked the intent required for induced infringement. See DSU, 471 F.3d at 1307. Namely, the jury could have concluded that Ecolab personnel reasonably believed that the use of Inspexx would not infringe FMC's patent claims because Inspexx contains a synergistic combination of three antimicrobial agents, and thus does not “consist essentially of” PAA. Dr. Cords's testimony also supports the conclusion that Ecolab personnel reasonably believed that the '676 patent did not cover Inspexx because Inspexx contains the same combination of antimicrobial agents disclosed in the prior art Oakes patent. While evidence of intent is not required to prove infringement, it is required to prove induced infringement. See id. Thus, even though Ecolab's product was ultimately found to infringe, the jury had substantial evidence from which it could have reasonably concluded that Ecolab did not induce infringement because it lacked the required intent.

II. The Permanent Injunction Motions

Both parties assert the district court erred in denying their respective motions for a permanent injunction. We need not consider Ecolab's assertion of error because we hold today that the claims found to be infringed by FMC are invalid as a matter of law;

thus, any error committed by the district court regarding its consideration of Ecolab's motion for injunctive relief is harmless.⁴ Regarding FMC's assertion of error, we vacate the district court's denial of its motion for a permanent injunction and remand for the district court to perform the required analysis.

To obtain injunctive relief, the plaintiff must demonstrate "(1) that it has suffered an irreparable injury; (2) that remedies available at law, such as monetary damages, are inadequate to compensate for that injury; (3) that, considering the balance of hardships between the plaintiff and defendant, a remedy in equity is warranted; and (4) that the public interest would not be disserved by a permanent injunction." eBay Inc. v. MercExchange, L.L.C., 547 U.S. 388, 391 (2006). We review the district court's decision to grant or deny injunctive relief for an abuse of discretion. Id. "We may find an abuse of discretion on a showing that the court made a clear error of judgment in weighing relevant factors or exercised its discretion based upon an error of law or clearly erroneous factual findings." Innogenetics, N.V. v. Abbott Labs., 512 F.3d 1363, 1379 (Fed. Cir. 2008) (internal quotation marks omitted). "To the extent the court's decision is based upon an issue of law, we review that issue de novo." Sanofi-Synthelabo v. Apotex, Inc., 470 F.3d 1368, 1374 (Fed. Cir. 2006).

Here, the district court failed to consider any of the eBay factors and failed to make any factual findings regarding those factors. That is an abuse of discretion. See eBay, 547 U.S. at 391–93 (instructing district courts to consider four equitable principles when assessing the propriety of injunctive relief in patent disputes); Nutrition 21 v.

⁴ For the same reasons, we need not consider FMC's argument that the district court imposed an improper damages award against it or Ecolab's arguments that the district court erred in denying its motions for enhanced damages, attorney fees, interest, and an accounting.

United States, 930 F.2d 867, 869 (Fed. Cir. 1991) (“Sufficient factual findings on the material issues are necessary to allow this court to have a basis for meaningful review.”). In eBay, the Supreme Court held that four traditional and well-established equitable principles apply when a patentee seeks equitable relief for infringement. 547 U.S. at 391–93. In that case, the Supreme Court vacated the injunction because “[n]either the District Court nor the Court of Appeals below fairly applied these traditional equitable principles in deciding respondent’s motion for a permanent injunction.” Id. at 393. We must do likewise and vacate the district court’s order. Because the district court decided FMC’s motion for injunctive relief without stating its reasons for denial, we must conclude that it failed to apply any of the traditional equitable principles discussed in eBay. Thus, the district court abused its discretion.

Although the district court did not consider the eBay factors, FMC nonetheless asserts that it made the required showing and that it is entitled to injunctive relief. However, we decline to analyze the eBay factors in the first instance. See Acumed LLC v. Stryker Corp., 483 F.3d 800, 811 (Fed. Cir. 2007) (“If we were to weigh the evidence ourselves to reach a conclusion on injunctive relief, we would effectively be exercising our own discretion as if we were the first-line court of equity. That role belongs exclusively to the district court. Our task is solely to review the district court’s decisions for an abuse of discretion.”); see also eBay, 547 U.S. at 394 (vacating an injunction and remanding “so that the District Court may apply that framework [i.e. the four equitable factors described in eBay] in the first instance”).

Accordingly, we vacate the district court's denial of FMC's motion for a permanent injunction, and we remand for the district court to perform the analysis required under eBay.

III. FMC's Motion for Prejudgment Interest

FMC asserts the district court abused its discretion when it denied FMC's motion for prejudgment interest, and we agree. It is unclear why the district court denied that motion because it gave no explanation for doing so. According to statute, “[u]pon finding for the claimant the court shall award the claimant damages adequate to compensate for the infringement, but in no event less than a reasonable royalty for the use made of the invention by the infringer, together with interest and costs as fixed by the court.” 35 U.S.C. § 284 (emphases added). When a patentee asserts a patent claim that is held to be valid and infringed, prejudgment interest is generally awarded. See GM Corp. v. Devex Corp., 461 U.S. 648, 656–57 (1983) (holding that some circumstances, such as a patentee's undue delay in prosecuting the lawsuit, may justify limiting or withholding prejudgment interest but noting that “prejudgment interest should be awarded under § 284 absent some justification for withholding such an award”). Accordingly, on remand, the district court must award interest or provide a valid justification for withholding interest.⁵

As for the parties' remaining arguments, we have carefully considered them and find them unpersuasive.

⁵ FMC additionally asserts that an accounting is necessary to adequately compensate it for Ecolab's infringement. To the extent that an accounting is so required—e.g. to calculate and award damages for post-verdict sales—the district court should order an accounting on remand.

Conclusion

For the foregoing reasons, the decision of the district court is affirmed-in-part, vacated-in-part, reversed-in-part, and remanded for further proceedings consistent with this opinion.

AFFIRMED-IN-PART, VACATED-IN-PART, REVERSED-IN-PART,

AND REMANDED

COSTS

No costs.