

BAB VI PENUTUP

6.1. Kesimpulan

1. Ada pengaruh nyata lama penyimpanan yogurt kolostrum terhadap aktivitas *Staphylococcus aureus* ATCC 25923, yaitu semakin lama penyimpanan semakin menurun aktivitas antimikrobanya baik dengan metode dilusi kontak dan metode difusi sumur.
2. Daya hambat yogurt kolostrum dengan metode dilusi kontak adalah 0,7574-0,1894 CFU/mL dan dengan metode difusi sumur adalah 0,3586-0,1437 cm. pH yogurt selama penyimpanan 4,6336-4,3488 dan total asam laktat 0,72-1,07%.

6.2. Saran

Perlu dilakukan penelitian lebih lanjut untuk mengetahui cara mempertahankan aktivitas antimikroba selama penyimpanan yogurt.

DAFTAR PUSTAKA

- Abe H., Saito, H. Miyakawa, Y. Tayura, S. Shimamura, E. Nagao dan M. Tomita. 1991. Nutritional Science Laboratory Morinaga Milk Industry., Ltd. No. 1-83, Chome, Higashara, Zama-city, Kanagawa-Pref, Japan 228. *J. Dairy Sci.* 74: 65-71.
- Ahmadi, M., A. B. Velcirov., M. Scurtu., T. Ahmadi dan L. Olariu. 2011. Benefits of Bovine Colostrum in Nutraceutical Products, *J. Agro. Pro. Technol.* 17 (1): 42-45.
- Ardiansyah. 2005. Daun Beluntas Sebagai Bahan Antibakteri dan Antioksidan. <http://www.beritaiptek.com/zberita-beritaiptek-2005-05-31-Daun-Beluntas-Sebagai-Bahan-Antibakteri-dan-Antioksidan.html>. (14 April 2014).
- Aslam M., M. Shahid, F. U. Rehman, N. H. Naveed, Al Batool, S. Sharif, & A. Asia, 2011. Purification and Characterization of Bacteriocin Isolat from *Streptococcus thermophilus*. *Af. J. Microbiol. Res.*, 5(18):2642-2648.
- Badan Standarisasi Nasional. *SNI 2981:2009: Yogurt*. http://sisni.bsn.go.id/index.php?/sni_main/sni/detail_sni/10235. (5 April 2014).
- Badan Standarisasi Nasional. *SNI 3141.1:2011: Susu Segar: Bagian 1-Sapi*. http://sisni.bsn.go.id/index.php?/sni_main/sni/detail_sni/11914. (14 April 2014).
- Badan Standarisasi Nasional. 1998. *SNI Susu Segar* (SNI 01-3141-1998). Dewan Standarisasi Nasional : Jakarta.
- Barefoot, S.F. and C. G. Neetles, 1993. Antibiosis revisited : bacteriocins produced by dairy starter culture. *J. Dairy Sci.*, 76 : 2366-2379.
- Beuchat J. L. R. 2002 Comparison of aqueous commercial cleaners for effectiveness in removing *Escherichia coli* O157:H7 and *Salmonella muenchen* from the surface of apples. *Int. J. Food Microbiol.* 2002;74(1-2):47-55.

- Buchanan, R. E. dan N. E. Gibson. 1974. *Bergeys Manual of Determination Bacteriology 8th edition*. Baltimore: The Williams and Wilkins Company.
- Buckle, K. A., R. A. Edwards., G. H. Fleet dan M. Wootton. 2009. *Ilmu Pangan*. Penerjemah: Hari Purnomo dan Adiono. Jakarta: UI Press.
- Blum, J. W. dan H. Hammon. 2000. Colostrum effects on the gastrointestinal tract, and on nutritional, endocrine and metabolic parameters in neonatal calves. *Livestock Production Science*. 66, 151-159
- Bourdy, C., J. P. Dehoux., D. Portetelle dan A. Buldgen. 2008. Bovine colostrum as a natural growth promoter for newly weaned piglets: a review, *Biotechnol Agron Soc Environ*. 12(2):157-170.
- Brooks, G.F., J.S. Butel, and L.N. Ornston. 1995. *Medical Microbiology*. 4th ed. Connecticut: Appleton & Lange, Simon & Schuster Company. p.197-202.
- Cankaya M., M. Sisecioglu, O. Yoruk, and H. Ozdemir. 2006. In Vitro Effects of Some Antibiotic Drugs on Bovine Lactoperoxidase Enzyme. *Turk J Med Sci* 2006; 36 (5): 301-306.
- Caplice, E. dan G.E. Fitzgerald. 1999. Food Fermentations: Role of Microorganisms in Food Production and Prevention. *International J. Food Microbiol* 50: 131-149.
- Capurro, A., C. Concha, L. Nilsson, K. Ostensson. 1999. Identification of coagulase positive *Staphylococci* isolated from bovine milk. *Acta Vet. Scand.*, 40:315-321.
- Chandan, R. C. 2006. *Manufacturing Yogurt and Fermented Milks*. Iowa: Balckwell Publishing.
- Commission Regulation (EC) No 1662/2006 of 6 November 2006 amending Regulation (EC) No. 853/2004 of the European Parliament and of the Council laying down specific hygiene rules for food of animal origin. *Official Journal of the European Union* No L 320 18.11.2006

- Connely, O. M. 2001. Antiinflammatory Activities of Lactoferrin (review), *J Am Coll Nut* 20 (2): 389S-395S.
- Davies R. C., A. Neuberger. 1969. Modification of Lysine and Arginine Residues of Lysozyme and the Effect on Enzymatic Activity. *Biochim Biophys Acta*. Apr 22;178(2):306-317.
- Diep, D.B., M. Skaugen, Z. Salehian, H. Hoho dan I.F.Nes. 2006. Common Mechanism of Target Cell Recognition and Immunity for Class IIBacteriocins. *PNAS The National Academy of Science of the USA*. 107(7):2384-2389.
- Effendi, H. M. S. 2009. *Teknologi Pengolahan dan Pengawetan Pangan*. Bandung: Alfabeta.
- Elfstrand, L., H. L. Mansson., M. Paulsson., L. Nyberg dan B. Akesson. 2002. Immunoglobulins, growth factors and growth hormone in bovine colostrum and the effects of processing, *Int Dairy J*. 12:879-887.
- Fardiaz, S. 1989. *Mikrobiologi Pangan: Penuntun Praktek Laboratorium*. Bogor: IPB Jurusan Teknologi Pangan dan Gizi.
- Farkey, N. Y. 2002. "Other Enzymes," (dalam *Encyclopedia of Dairy Sciences*, H. Roginski, J. W. Fuquay, P. F. Fox Ed.) Amsterdam: Academic Press, vol. 3, pp. 946-947.
- Fellows P. 1990. *Food Processing Technology Principles and Practice*. New York : Ellis Hawood.
- Food Standards Australia New Zealand. *Yogurt, Natural, Regular Fat (3,5%)*. <http://www.foodstandards.gov.au/consumerinformation/nuttab2010/nuttab2010online searchabledatabase/onlineversion.cfm?&action=getFood&foodID=09C10088>. (9 April 2014).
- Fox, P. F. dan A. L. Kelly. 2006. Indigenous enzymes in milk: overview and historical aspects. Part 2., *Int. J. Dairy*. 16, 517-532.
- Georgiev, I. P. 2008, Differences in chemical composition between cow colostrum and Milk. *Bulgarian J. Vet Med*, 11(1): 3-12

- Gopal, P. K. dan H. S. Gill. 2000. Oligosaccharides and glycoconjugates in bovine milk and colostrum. *British J. Nutr.*, 84, Suppl !, S69-S74
- Helferich, W. dan D. Westhoff. 1980. *All About Yogurt*. Practice Hall Inc., New Jersey.
- Hendriani, R., R. Tina, dan A. G. K. Sri. 2009. Penelusuran Antibakteri Bakteriosin dari Bakteri Asam Laktat Dalam Yoghurt Asal Kabupaten Bandung Barat Terhadap *Staphylococcus aureus* dan *Escherichia coli*. *Lembaga Penelitian dan Pengabdian Kepada Masyarakat Universitas Padjadjaran*. Bandung.
- Herawati, D. A. dan D. Andang. 2011. Pengaruh Konsentrasi Susu Skim Dan Waktu Fermentasi Terhadap Hasil Pembuatan Soyghurt. *Jurnal Ilmiah Teknik Lingkungan* 1 (2).
- Hui, Y. H. 1992. *Dairy Science and Technology Handbook volume 1: Principles and Properties*. New York: VCH Publishers, Inc.
- Houser, B. A., S. C. Donaldson., S. I. Kehoe., A. J. Heinrichs dan B.M. Jayarao. 2008. A Survey of Bacteriological Quality and the Occurrence of *Salmonella* in Raw Bovine Colostrum, *Foodborne Pathogens and Disease*. 5 (6): 853-858.
- Institute of Food Science and Technology, Nanjing Agricultural University. Microbime. <http://jpkc.njau.edu.cn/spwswx/cankao/ShowArticle.asp?ArticleID=314>. (23 Agustus 2014).
- Januarsyah, T. 2007. Kajian Aktivitas Hambat Bakteriosin Dari Bakteri Asam Laktat Galur SCG1223. Fakultas Teknologi Pertanian Institut Pertanian Bogor. Bogor.
- Jawetz, E., J.L. Melnick., E.A. Adelberg., G.F. Brooks., J.S. Butel., dan L.N. Ornston. 1995. *Mikrobiologi Kedokteran*. Edisi ke-20 (Alih bahasa : Nugroho & R.F.Maulany). Jakarta : Penerbit Buku Kedokteran EGC. hal. 211,213,215.
- Jay, James. 1992. *Modern Food Microbiology*. Fourth Edition. New York: Michigan publishing.

- Karen, J. L., W. Hong., A. Mueen., S. Zou dan L. H. Walter. 1996. Antimicrobial proteins in milk, *Illinois Dairy Report*. ANSCI 308.
- Kehoe, S. I., B.M. Jayara dan A. J. Heinrichs. 2007. A survey of bovine colostrum composition and colostrum management practices on Pennsylvania dairy farms, *J. Dairy Sci.* 90: 4108- 4116.
- Korhonen, H., P. Marnila dan H. S. Gill. 2000a. Bovine milk antibodies for health, *British J Nutr.* 84:35-46.
- Korhonen, H., P. Marnila dan H. S. Gill. 2000b. Milk immunoglobulins and complements factor, *Br J Nutr.* 84:S75-80.
- Korhonen, H. 2009. Bioactive components in bovine milk. (dalam *Bioactive Components in Milk and Dairy Products* (ed. Y. Park), pp. 15–42). Wiley-Blackwell, Ames, IA.
- Kussendrager, K. D. dan A. C. M. Van Hooijdkank. 2000. Lactoperoxidase: physico-chemical properties, occurrence, mechanism of action and applications, *British J. of Nutrition.* 84 (supplement 1): 19-25.
- Kustiawan, E., H. Purnomo, dan L. E. Radiati. 2010. Pengaruh Pemanasan dan Lama Penyimpanan Pasca Fermentasi Terhadap Konsentrasi Laktoferin Susu Kambing Dan Kefir. *J. Ilmu dan Teknologi Hasil Ternak.*, Vol 5, No.2, hal 1-8.
- Lang, B. 2010. Colostrum for the Dairy Calf. <http://www.omafra.gov.on.ca/english/livestock/veal/facts08-001.htm>. (24 Agustus 2014)
- Lazzaro, J. 2000. *Colostrum/Supplementing Colostrum*. wichway@saanedoah.com (6 September 2014).
- Limsonwtin, G. 1992. Inhibition of starter cultures, *Aust. J. Dairy Technol.* 47: 100.
- Losnedahl, K. J., H. Wang., M. Aslam., S. Zou dan W. L. Hurley. 1998. Antimicrobial factor in milk. [terhubung berkala]. <http://www.livestocktrail.uiuc.edu/dairynet/paperDisplay.cfm?ContentID=229> [11 Agustus 2014].

- Madigan, T. Michael, dan Martinko, J. 2006. *Brock Biology of Microorganisms*. Eleventh edition. By Pearson Education, Inc. Pearson Prentice Hall.USA.
- Mathot A. G, E. Beliard & D. Thuault, 2003.*Streptococcus thermophilus* 580 Produces a Bacteriocin Potentially Suitable for Inhibition of *Clostridium tyrobutyricum*. *J.Dairy. Sci.*, 86:3068-3074.
- Moeljanto, R. D. dan B. T. W. Wiryanta. 2002. Khasiat dan Manfaat Susu Kambing: Susu Terbaik dari Hewan Ruminansia. Tangerang: Agro Media Pustaka.
- Naidu, A. S. dan R. A. Clemens. 2000. Natural Food Antimicrobial System: Probiotics. CRC Press. New York. Hal. 431-462
- Najmuddin, A. 2006. Aktivitas Antimikroba Yogurt Probiotik Dari Susu Kambing Saanen Dan Pesa (Persilangan Peranakan Etawah Dan Saanen) Selama Penyimpanan). Skripsi Fakultas Peternakan Institut Pertanian Bogor.
- NCCLS. 2006. Clinical and Laboratory Standards Institute. All Rights Reserved. Vol 26. M7-A7.
- Neetles, C.G. and S. F. Barefoot. 1993. Biochemical and Genetic Characteristic of Bacteriocins of Food-Associated Lactic Acid Bacteria. *J. Food Prot.*, 56 : 338-356.
- Nes I. F., D. B. Diep dan H. Holo, 2007. Bacteriocin Diversity on *Streptococcus* and *Enterococcus*. *J.Bacteriology*, 1189-1198.
- Nugroho, J. 2013. Keracunan Dipicu Bakteri Staphylococcus aureus. <http://www.harianjogja.com/baca/2013/09/08/warga-keracunan-dipicu-bakteri-staphylococcus-aureus-445452.htm> (9 Agustus 2014)
- Østdal, H., M. J. Bjerrum, J. A. Pedersen, & J. H. Andersen. 2000. Lactoperoxidase-induced protein oxidation in milk. *J. Agric. Food Chem.*, 48, 3939 - 3944.

- Pakkanen, R. dan J. Aalto. 1997. Growth factors and antimicrobial factors of bovine colostrum – review paper. *Int. Dairy J.* 7: 285–297.
- Pandey, N. N., A. A. Dar., D. B. Mondal dan L. Nagaraja. 2011. Bovine Colostrum: A Veterinary Nutraceutical: a Review. *J. Vet Med Animal Health*. Vol 3(3), pp, 33-35
- PDRhealth. 2005.
Lactoferrin. http://www.pdrhealth.com/drug_info/nmdrug-profiles/Nutsupdrugs. (9 September 2014)
- Pelczar, M.J., E. C. S. Chan. 1988. *Dasar-dasar Mikrobiologi*. Universitas Indonesia. Jakarta.
- Pellegrini, A., U. Thomas., R. V. Fellenberg dan P. Wild. 1992. Bactericidal Activities of Lysozim and Aprotinin Against Gram-negative and Gram-positive bacteria Related to their Basic Character, *J. Applied Bacteriology*. 72: 180-187.
- Pruitt, K. M. dan B. Reiter. 1985. *Biochemistry of Peroxidase system* (dalam *the Lactoperoxidase System Chemistry and Biological Significance*.. K. M. Pruitt and J. Tenovuo, Eds). PP.143-178. New York: Marcel Dekker.
- Rahman, A., S. Fardiaz, W. T. Raharju, Suliantari dan C. C. Nurwitri. 1992. *Teknologi Fermentasi Susu*. Bogor: Depdikbud dan Dirjen Dikti PAU Pangan dan Gizi IPB.
- Robinson, R.K.. 1999. *Modern Dairy Technology Volume 1 : Advances in Milk Processing*. 2nd Edition. AnAspen Publication, AspenPublisher, Inc. Gaithersburg, Maryland. P:323-325
- Robinson, R. K. 2002. Yoghurt, Role of Starter Cultures, (dalam *Encyclopedia of Dairy Science*, H. Roginski, J. Fuquay dan P. Fox, Ed.) Academic Press, United Kingdom, 1059-1063.
- Rozi, A. F., L. E. Radiati, dan D. Rosyidi. 2011. Pengaruh Lama Simpan Yogurt *Drink* Pada Suhu *Refrigerator* Terhadap Nilai Ph, Viskositas, Sineresis Dan *Total Plate Count* (Tpc). *J. Dairy Sci* P:1-7
- Rucketbusch, Y., L. P. Phaneuf dan R. Dunlop. 1991. *Physiology of small and Large Animals*. Philadelphia-Hamilton: B.C. Decker, Inc.

- Ryan, K.J., J.J. Champoux, S. Falkow, J.J. Plonde, W.L. Drew, F.C. Neidhardt, and C.G. Roy. 1994. *Medical Microbiology An Introduction to Infectious Diseases*. 3rd ed. Connecticut: Appleton&Lange. p.254.
- Saravanan, R., A. Shanmugam, P. Ashok, D. S. Kumar, K. Anand, A. Suman, and F. R. Devadoss. 2009. Studies on Isolation and Partial Purification of Lysozyme from Egg White of the Lovebird (*Agapornis* species). *African J. Biotech.* 8(1): 107-109.
- Savadogo A, C. A. T. Ouattara, I. H. N. Bassole & S. A. Traore,2006. Bacteriocin and Lactic Acid Bacteria. *African J. Biotech*,5(9):678-683.
- Schanbacher, F. L., R. E. Goodman., R. S. Talhouk. 1993. Bovine Mammary Lactoferrin: Implications from Messenger Ribonucleic Acid (Mrna) Sequence and Regulation Contrary to Other Milk Proteins, *J Dairy Sci* 76: 3812-3831.
- Seifu, E., E. M. Buys,E. F. Donkin. &I. M. Petzer. 2004. Antibacterial activity of the lactoperoxidase system against food-borne pathogens in Saanen and South African Indigenous goat milk. *Food Control*, 15, 447-452.
- Seifu , E., E. M. Buys dan E. F. Donkin. 2005. Significance of the lactoperoxidase system in the dairy industry and its potential applications: a review. *Trends in Food Science and Technology* 16 : 137 – 154 .
- Shakeel-ur, R., N. Y. Farkye, & R. Hubert. 2002. Enzymes indigenous to milk - lactoperoxidase. *Encyclo.Dairy Sci. Oxford: Elsevier.*, 938-941.
- Shimazaki K., N. Kawano, N. C. Yoo.1993. *Comp. Biochem. Physiol.* 98:417-422.
- Shrinivas, B., P. Rajesh dan S. Manisha. 2010. Colostrum: All in one Medicine, int. *J. Pharmacy Pharmaceutical Sci., Vol 2, Suppl 1.*

- Siamansouri, M., S. Mozaffari, and F. Alikhani. 2013. Bacteriocins and Lactic Acid Bacteria. *J. Bio and Today's World* vol 2, issue 5, page 227-234
- Surajudin, R. Fauzi, dan D. Purnomo. 2004. Yoghurt Susu Fermentasi yang Menyehatkan. Jakarta: AgroMedia.
- Tagg, J. R. and McGiven. 1971. Assay System For Bacteriocins. *J.Appl. Microbiol.* 221:943.
- Tamime, A. Y. dan R. K. Robinson. 2007. Yoghurt Science and Technology Third Edition. England: Woodhead Publishing Limited.
- Thapa, B. R. 2005. Therapeutic potentials of bovine colostrums. *Ind J Pediatr*, 72: 849-852.
- Tufail M, S. Husain, F. Malik, T. Mirza, G. Parveen, S. Shafaat, A. Wajid, R. Mahmood, R. A. Channa & A. Sadiq, 2011. Isolation and evaluation of antibacterial activity of bacteriocin produced by *Lactobacillus bulgaricus* from yoghurt. *African J. Microbiol*, 5(22):3842-3847.
- Vandenberg, R.A. 1993. Lactic Acid Bacteria on It's Metabolic Products and Interference with Microbial Growth. *FEMS Microbiol. Rev.* 12 : 221-238.
- Wadhai, V. S., V. K. Dhawas. 2011. Characterization and Study of *Lactobacillus Bulgaricus* As Probiotic Bacteria. *Online J. Int. Interdisciplinary Res.*, ISSN2249-9598, vol I, Issue-II, Nov-Dec 2011
- Wahyudi, M. 2006. Proses Pembuatan dan Analisis Mutu Yoghurt. *Buletin Teknik Pertanian* 11 (1), 2006.
- Walstra, P., R. Jenness. 1983. *Dairy Chemistry and Physics*. New York: John Wiley and Sons, Inc.
- Warsa, U.C. 1994. Staphylococcus dalam Buku Ajar Mikrobiologi Kedokteran. Edisi Revisi. Jakarta : Penerbit Binarupa Aksara. hal. 103-110.

- Winarno, F. G., W. Ahnan, dan W. Widjajanto. 2003. *Flora Usus dan Yogurt*. Bogor: M-Brio Press.
- Winarno, F. G. dan Fernandez, I. E. 2007. *Susu dan Produk Fermentasinya*. Bogor: M-Brio Press.
- Waterman, M. A. 1998. Investigative Case Study Approach For Biology Learning. <http://acube.org/volume24/v24lp310.pdf>. (20 April 2014).
- Wolfson, L.M. dan S. S. Sumner., 1993. Antibacterial activity of the lacoberoxidase system: a review, *J. Food Prot.* 56: 887.
- Yamaguchi, Y., M. Semmel., L. Stanislawski., A.D. Strosberg dan M. Stanislawski. 1993. Virucidal Effects of Glucose Oxidase and Peroxidase or Their Protein Conjugates on Human Immunodeficiency VirusType 1, *Antimicrobial Agents and Chemotherapy.* 37: 26-31.
- Yoguchi, H., T. Goto dan S. Okonagi. 1992. Fermented Milks, Lactic Drinks and Intestinal Microflora. (dalam Nakazawa, Y. dan Hosono, A. (eds). *Function of Fermented Milk, Chalange for The Health Science*, hlm 247). *Elsevier Applied Science*, New York.
- Zecconi, A.; G. Hahn. 2000. *Staphylococcus aureus* in raw milk and human health risk. *Bull. IDF*, 345:15-18.