PREDIKSI UMUR PUBERTAS DAN LAJU PERTUMBUHAN SAPI BETINA PERANAKAN ONGOLE DAN BRAHMAN DENGAN MODEL MATEMATIK *NONLINEAR*

INTISARI

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Pertumbuhan dapat digambarkan menggunakan model matematik. Model matematik yang sesuai agar mudah diinterpretasikan secara biologikal dan analitik adalah model matematik *non linear.* Penelitian ini bertujuan untuk mengevaluasi penerapan model matematik *non linear* dalam memprediksi umur pubertas dan laju pertumbuhan sapi betina Peranakan Ongole (PO) dan Brahman. Data yang digunakan dalam penelitian ini berupa catatan bobot tubuh dari tujuh ratus enam puluh delapan (768) ekor sapi betina PO dan tujuh ratus tiga puluh delapan ekor (738) sapi betina Brahman dengan umur mulai dari lahir (<1 bulan) sampai umur dewasa (60 bulan). Catatan bobot tubuh sapi betina PO telah dikumpulkan oleh Asosiasi Peternak Sapi PO Kebumen (ASPOKEB) dari tahun 2013 sampai 2015 yang berasal dari kelompok ternak di Kecamatan Mirit, Lembu Purwo, Ambal, Puring, dan Petanahan. Catatan bobot tubuh sapi Brahman telah dikumpulkan oleh Balai Pembibitan Ternak Unggul dan Hijauan Pakan Ternak (BPTU-HPT) Sembawa dari tahun 2012 sampai 2015. Pengumpulan data dilakukan dengan metode *cross sectional*, selanjutnya data dianalisis menggunakan empat model matematika non linear yaitu model Brody, Bertalanfy, Logistic dan Gompertz. Hasil prediksi umur pubertas masing-masing model matematik dilanjutkan dengan uji *vaginal smear* dan konsentrasi hormon estrogen dalam darah. Berdasarkan nilai R^2 tertinggi dan nilai MSE terkecil, model Bertalanfy paling tepat dalam menggambarkan umur pubertas sapi betina PO dan Brahman. Akan tetapi setelah dilakukan uji vaginal smear dan konsentrasi estradiol dalam darah, model Logistic, Bertalanfy, dan Gompertz underestimate dalam memprediksi umur pubertas sapi PO dan Brahman. Hal ini dibuktikan dengan hasil pengamatan perubahan histologi sel epitel vagina dan konsentrasi estrogen dalam darah, dimana keseluruhan ternak masih dalam fase folikuler. Kecepatan pertumbuhan sebelum pubertas sapi betina PO dan Brahman paling tepat digambarkan oleh model Logistic.

Kata kunci: Bobot dewasa, Estrogen, *Inflection point*, V*aginal smear*.

PREDICTION OF AGE AT PUBERTY AND GROWTH RATE OF ONGOLE GRADE AND BRAHMAN FEMALE CATTLE WITH NONLINEAR MATHEMATICAL MODEL

ABSTRACT

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Growth can be described by using a mathematical model. The appropriate mathematical model which is easy to interpret biologically and analytically is the nonlinear model. This research aimed to evaluate the nonlinear mathematical model in predicting the onset of puberty and the growth rate of Kebumen Ongole Grade (PO) and Brahman female cattle. The recording data of body weight seven hundred and sixty-eight (768) PO female cattle and seven hundred and thirty eight (738) Brahman female cattle with age ranging from birth (< 1 month) to mature (60 months) were used in this research. Recording of the body weight PO female cattle were collected by Kebumen PO Cattle Breeder Association (ASPOKEB) from 2013 to 2015 from group of farmers located in six sub-district: Mirit, Lembu Purwo, Ambal, Puring, Petanahan, and Klirong. Recording of the body weight Brahman female cattle were collected by Balai Besar Pembibitan Ternak Unggul dan Hijauan Pakan Ternak (BPTU-HPT) Sembawa from 2012 to 2015. Data were collected by cross sectional method, Brody, Bertalanfy, Logistic dan Gompertz mathematical models were used to analyzed the data. The prediction results of age puberty each mathematical models continued by vaginal smear and consentration of estrogen hormone in the blood test. Best on the highest value of R^2 and the smallest value of MSE, the best model in describing age at puberty of PO and Brahman female cattle was Bertalanfy model. However after tested by vaginal smear and estradiol concentration, Logistic, Bertalanfy, and Gompertz model was underestime in predicting age at puberty of PO and Brahman female cattle. It is shown by the results of vaginal epithel histological change observation and concentration of estrogen hormone in blood, where all of animals observed were still in follicular phase. The Logistic model was the best model in describing growth rate before puberty of PO and Brahman female cattle.

Keywords: Bobot dewasa, Estrogen, Inflection point, Vaginal smear.