



ภาคผนวก

ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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**ตารางภาคผนวก 1.** Analysis of Variance of Linear regression between weight and age from birth to 12 year

SOV	df	SS	MS	F-value	Pr>F
Regression	1	77087464.573	77087464.573	34585.217	.000
Residual	21132	47101404.688	2228.914	–	–
Total	21133	124188869.262	–	–	–

**ตารางภาคผนวก 2.** Analysis of Variance of Quadratic curvilinear between weight and age from birth to 12 year

SOV	df	SS	MS	F-value	Pr>F
Regression	2	97927228.147	48963614.073	39397.771	.000
Residual	21131	26261641.115	1242.802	–	–
Total	21133	124188869.262	–	–	–

**ตารางภาคผนวก 3.** Analysis of Variance of Cubic curvilinear between weight and age from birth to 12 year

SOV	df	SS	MS	F-value	Pr>F
Regression	3	101603921.039	33867973.680	31686.160	.000
Residual	21130	22584948.223	1068.857	–	–
Total	21133	124188869.262	–	–	–

**ตารางภาคผนวก 4.** Analysis of Variance of Linear regression between weight and age from birth to 200 days

SOV	df	SS	MS	F-value	Pr>F
Regression	1	1189402.551	1189402.551	9440.083	.000
Residual	3511	442368.180	125.995	–	–
Total	3512	1631770.730	–	–	–

**ตารางภาคผนวก 5.** Analysis of Variance of Quadratic curvilinear between weight and age from birth to 200 days

SOV	df	SS	MS	F-value	Pr>F
Regression	2	1196474.512	598237.256	4823.871	.000
Residual	3510	435296.218	124.016	–	–
Total	3512	1631770.730	–	–	–

**ตารางภาคผนวก 6.** Analysis of Variance of Cubic curvilinear between weight and age from birth to 200 days

SOV	df	SS	MS	F-value	Pr>F
Regression	3	1197103.362	399034.454	3221.341	.000
Residual	3509	434667.369	123.872	–	–
Total	3512	1631770.730	–	–	–

**ตารางภาคผนวก 7.** Analysis of Variance of Linear regression between weight and age from 200 days to 18 months

SOV	df	SS	MS	F-value	Pr>F
Regression	1	910435.826	910435.826	1856.082	.000
Residual	4883	2395183.814	490.515	–	–
Total	4884	3305619.639	–	–	–

**ตารางภาคผนวก 8.** Analysis of Variance of Quadratic curvilinear between weight and age from 200 days to 18 months

SOV	df	SS	MS	F-value	Pr>F
Regression	2	925106.920	462553.460	948.613	.000
Residual	4882	2380512.720	487.610	–	–
Total	4884	3305619.639	–	–	–

**ตารางภาคผนวก 9.** Analysis of Variance of Cubic curvilinear between weight and age from 200 days to 18 months

SOV	df	SS	MS	F-value	Pr>F
Regression	2	925106.920	462553.460	948.613	.000
Residual	4882	2380512.720	487.610	–	–
Total	4884	3305619.639	–	–	–

**ตารางภาคผนวก 10.** Analysis of Variance of Linear regression between weight and age from 18 months to 3 – 4 years

SOV	df	SS	MS	F-value	Pr>F
Regression	1	4419808.361	4419808.361	3774.073	.000
Residual	5985	7009020.002	1171.098	–	–
Total	5986	11428828.363	–	–	–

**ตารางภาคผนวก 11.** Analysis of Variance of Quadratic curvilinear between weight and age from 18 months to 3 – 4 years

SOV	df	SS	MS	F-value	Pr>F
Regression	2	4471587.375	2235793.688	1923.031	.000
Residual	5984	6957240.987	1162.641	–	–
Total	5986	11428828.363	–	–	–

**ตารางภาคผนวก 12.** Analysis of Variance of Cubic curvilinear between weight and age from 18 months to 3 – 4 years

SOV	df	SS	MS	F-value	Pr>F
Regression	2	4474288.322	2237144.161	1924.940	.000
Residual	5984	6954540.040	1162.189	–	–
Total	5986	11428828.363	–	–	–

**ตารางภาคผนวก 13.** Analysis of Variance of Linear regression between weight and age from 3 – 4 years to 12 years

SOV	df	SS	MS	F-value	Pr>F
Regression	1	736005.794	736005.794	402.674	.000
Residual	6779	12390619.714	1827.795	–	–
Total	6780	13126625.508	–	–	–

**ตารางภาคผนวก 14.** Analysis of Variance of Quadratic curvilinear between weight and age from 3 – 4 years to 12 years

SOV	df	SS	MS	F-value	Pr>F
Regression	2	737662.447	368831.223	201.788	.000
Residual	6778	12388963.061	1827.820	–	–
Total	6780	13126625.508	–	–	–

**ตารางภาคผนวก 15.** Analysis of Variance of Cubic curvilinear between weight and age from 3 – 4 years to 12 years

SOV	df	SS	MS	F-value	Pr>F
Regression	3	738677.778	246225.926	134.701	.000
Residual	6777	12387947.730	1827.940	–	–
Total	6780	13126625.508	–	–	–

**ตารางภาคผนวก 16.** Analysis of Variance of Brody equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.6291 \times 10^8$	$1.543 \times 10^8$	-1398.4	0.0001
Residual	21131	$1.4313 \times 10^8$	6773.6	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 17.** Analysis of Variance of Exponential equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.7709 \times 10^8$	$1.9236 \times 10^8$	140391	0.0001
Residual	21131	28953329	1370.2	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 18.** Analysis of Variance of Bertalanffy equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.7812 \times 10^8$	$1.9271 \times 10^8$	145853	0.0001
Residual	21131	27919023	1321.2	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 19.** Analysis of Variance of Richards equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	4	$5.7776 \times 10^8$	$1.4444 \times 10^8$	107934	0.0001
Residual	21130	28276743	1338.2	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 20.** Analysis of Variance of Logistic equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.787 \times 10^8$	$1.929 \times 10^8$	149073	0.0001
Residual	21131	27343326	1294.0	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 21.** Analysis of Variance of Gompertz equation by Steepest Descent method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.7846 \times 10^8$	$1.9282 \times 10^8$	147753	0.0001
Residual	21131	27576391	1305.0	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 22.** Analysis of Variance of Brody equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8331 \times 10^8$	$1.9444 \times 10^8$	47153.5	0.0001
Residual	21131	22732838	1075.8	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 23.** Analysis of Variance of Exponential equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	2	$5.0942 \times 10^8$	$2.5471 \times 10^8$	55708.1	0.0001
Residual	21132	96620066	4572.2	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 24.** Analysis of Variance of Bertalanffy equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8328 \times 10^8$	$1.9443 \times 10^8$	180544	0.0001
Residual	21131	22755996	1076.9	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 25.** Analysis of Variance of Richards equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8319 \times 10^8$	$1.944 \times 10^8$	179793	0.0001
Residual	21131	22847401	1081.2	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 26.** Analysis of Variance of Logistic equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8258 \times 10^8$	$1.9419 \times 10^8$	174935	0.0001
Residual	21131	23457297	1110.1	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 27.** Analysis of Variance of Gompertz equation by Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8314 \times 10^8$	$1.9438 \times 10^8$	179389	0.0001
Residual	21131	22896993	1083.6	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 28.** Analysis of Variance of Brody equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8331 \times 10^8$	$1.9444 \times 10^8$	47153.5	0.0001
Residual	21131	22732838	1075.8	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–



**ตารางภาคผนวก 29.** Analysis of Variance of Exponential equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8331 \times 10^8$	$1.9444 \times 10^8$	47153.5	0.0001
Residual	21131	22732838	1075.8	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 30.** Analysis of Variance of Bertalanffy equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8328 \times 10^8$	$1.9443 \times 10^8$	180544	0.0001
Residual	21131	22755996	1076.9	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 31.** Analysis of Variance of Richards equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	4	$5.8336 \times 10^8$	$1.4584 \times 10^8$	135878	0.0001
Residual	21130	22679227	1073.3	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 32.** Analysis of Variance of Logistic equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8258 \times 10^8$	$1.9419 \times 10^8$	174935	0.0001
Residual	21131	23457297	1110.1	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 33.** Analysis of Variance of Gompertz equation by Gauss-Newton method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8314 \times 10^8$	$1.9438 \times 10^8$	179389	0.0001
Residual	21131	22896993	1083.6	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 34.** Analysis of Variance of Brody equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8331 \times 10^8$	$1.9444 \times 10^8$	47153.5	0.0001
Residual	21131	22732838	1075.8	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 35.** Analysis of Variance of Exponential equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8331 \times 10^8$	$1.9444 \times 10^8$	47153.5	0.0001
Residual	21131	22732838	1075.8	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 36.** Analysis of Variance of Bertalanffy equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8328 \times 10^8$	$1.9443 \times 10^8$	180544	0.0001
Residual	21131	22755996	1076.9	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 37.** Analysis of Variance of Richards equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	4	$5.8336 \times 10^8$	$1.4584 \times 10^8$	135878	0.0001
Residual	21130	22679227	1073.3	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 38.** Analysis of Variance of Logistic equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8258 \times 10^8$	$1.9419 \times 10^8$	174935	0.0001
Residual	21131	23457297	1110.1	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 39.** Analysis of Variance of Gompertz equation by Marquardt method

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$5.8314 \times 10^8$	$1.9438 \times 10^8$	179389	0.0001
Residual	21131	22896993	1083.6	–	–
Total	21134	$6.0604 \times 10^8$	–	–	–

**ตารางภาคผนวก 40.** Analysis of Variance of Brody equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$1.4655 \times 10^8$	48851210	20164.3	0.0001
Residual	6687	6426622	961.1	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 41.** Analysis of Variance of Exponential equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$1.4655 \times 10^8$	48851210	20164.3	0.0001
Residual	6687	6426622	961.1	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 42.** Analysis of Variance of Bertalanffy equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$1.4659 \times 10^8$	48863671	51140.9	0.0001
Residual	6687	6389239	955.5	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 43.** Analysis of Variance of Richards equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	4	$1.4661 \times 10^8$	36652349	38465.4	0.0001
Residual	6686	6370854	952.9	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 44.** Analysis of Variance of Logistic equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$1.4624 \times 10^8$	48746386	48355.2	0.0001
Residual	6687	6741095	1008.1	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 45.** Analysis of Variance of Gompertz equation by Gauss-Newton method in male cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$1.4653 \times 10^8$	48843466	50639.3	0.0001
Residual	6687	6449853	964.5	–	–
Total	6690	$1.5298 \times 10^8$	–	–	–

**ตารางภาคผนวก 46.** Analysis of Variance of Brody equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.4126 \times 10^8$	$1.4709 \times 10^8$	37666.1	0.0001
Residual	14441	11797192	816.9	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

**ตารางภาคผนวก 47.** Analysis of Variance of Exponential equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.4126 \times 10^8$	$1.4709 \times 10^8$	37666.1	0.0001
Residual	14441	11797192	816.9	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

**ตารางภาคผนวก 48.** Analysis of Variance of Bertalanffy equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.4117 \times 10^8$	$1.4706 \times 10^8$	178577	0.0001
Residual	14441	11891930	823.5	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

**ตารางภาคผนวก 49.** Analysis of Variance of Richards equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	4	$4.4127 \times 10^8$	$1.1032 \times 10^8$	135090	0.0001
Residual	14440	11791919	816.6	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

**ตารางภาคผนวก 50.** Analysis of Variance of Logistic equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.4065 \times 10^8$	$1.4688 \times 10^8$	171005	0.0001
Residual	14441	12404080	858.9	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

**ตารางภาคผนวก 51.** Analysis of Variance of Gompertz equation by Gauss-Newton method in female cattle

SOV	df	SS	MS	F-value	Pr>F
Regression	3	$4.4105 \times 10^8$	$1.4702 \times 10^8$	176850	0.0001
Residual	14441	12005033	831.3	–	–
Total	14444	$4.5306 \times 10^8$	–	–	–

## ประวัติผู้เขียน

ชื่อ-สกุล นางสาวนริศรา หาญชาติ

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ประวัติการศึกษา สำเร็จการศึกษาระดับมัธยมศึกษาตอนต้น

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ลิขสิทธิ์มหาวิทยาลัยเชียงใหม่

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