

بسم الله الرحمن الرحيم

*Sudan University of Science and Technology
College of Graduate Studies*

**Use of Mathematical Modeling in Evaluating Production
Performance of Commercial Layers Under Sudan Conditions
(Khartoum state).**

**استخدام المعادلات الرياضية لتقويم الاداء الإنتاجي
لدجاج البيض التجاري تحت ظروف السودان (ولاية
الخرطوم).**

By:

Ameer Ahmed El Obied Omer

B.Sc in Animal Production Science and Technology

Sudan University of Science and Technology

1999

*A dissertation submitted in partial fulfillment of requirement for the degree of
Master of Science (M. Sc) in (Animal Production in Tropic):*

Supervisor:

Dr. Badr Hassb El Rasoul ElJack

Sudan University of Science and Technology

College of Veterinary Medicine and Animal Production

October 2008

Dedication

To the spirit of my father.

To my dear mother who granted me all beautiful things in life.

To my brother El Fatih.

To my sisters Sohair and Sakina.

To my wife Amal .

To my friends and colleagues.

With love .

Acknowledgment

My gratitude and faithful thanks and praise be to Allah, for providing me health, strength and patience to conduct this study.

My thanks and appreciation to my supervisor Dr. Badr Hassab ElRasoul for his advices and patient assistance.

My thanks to Dr. Muzzamil Atta (University of Juba) for his valuable assistance and support through the study period.

All thanks to my friends Hadia Ahmed, Tayseir Zain Elabdein and Nissreen Mahmoud for continuous assistance in data collection and printing.

The model of wood (1967) which is used to fit the lactation yield data of dairy cattle on time had been adopted here to fit egg production curve for two hybrid layer strains and their standard manual.

The strains are Hyline W98 and Lohmman LSL which kept under Sudan conditions. The egg production performance data of four poultry farms in different size in Khartoum state were used. Two of those farms reared Lohmman LSL hybrid strain while the other two farms reared Hyline W98 hybrid strain. The traits of age at the first lay, age at 50%, H.D production, age at peak production, percentage at peak, mortality rate, feed intake and production period were calculated and tested for the significance of difference between the two layer hybrid strains using t-test. The difference between each hybrid strain and the standard reported on its manual was also tested using single sample t-test. The weekly H.D egg production from 5% production for each farm was regressed on time according to wood (1967) lactation curve equation:-

$$Y = a \times b \cdot e^{-cx}$$

Where:-

Y = egg production. a = initial egg production.

x = age in week. b = rate of increase to the peak.

c = rate of decrease from the peak.

No significant difference between the two hybrid strains and their standard values were found in most of the production traits.

There is a significant difference ($P < 0,05$) in mortality rate up to the end of production in each hybrid strain when compared to its standard manual. Hyline W98 feed consumption was significantly ($P < 0,05$)

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lower than that of Lohmman LSL where as feed conversion ratio of

Hyline W98 was significantly ($P < 0,05$) improved. Egg weight of Lohmman LSL was significantly ($P < 0,05$) higher than that of Hyline W98 while the later has longer production cycle. Mortality rate of Hyline W98 was higher during the period from first lay up to the end of production than that of lohmmaan LSL but the difference was not significant.

The components of the production curve were examined for significance of different between the two hybrid strains using t-test.

The components of the production curve were:-

a = age of first egg.

b = rate of increase of curve to peak.

c = rate of decrease of curve from the peak.

b/c = week of the peak.

$b + 1 \ln c$ = persistency of the peak of the curve.

No significant differences between the two hybrid strains and their corresponding standard values in production curve parameters.

The study results concluded that the formula of wood (1967) could be precisely fitted the data of the egg production and therefor it can be used for the prediction and evaluation of egg production.

The study also concluded that the two hybrid strains perform under Sudan conditions were similar to their standard manuals which indicating that these hybrid strains have a good adaptability to the tropical environments.

Further more, there are no differences between the two hybrid strains in most of the traits examined.

ملخص الأطروحة

تم استخدام نموذج Wood 1967 المستخدم في إيجاد منحى إنتاج الحليب من السجلات اليومية لابقار اللبن , تم استخدامه لإيجاد منحى إنتاج البيض لسلاطين من سلالات الدجاج البيض وهى (الهلى لاین 98 واللوهمل) المرابة في ظروف السودان .

تم جمع البيانات من السجلات اليومية لارب مزارع مختلفة بولاية الخرطوم . وتمت تربية اللوهمل في مزرعتين والهلى لاین في الاخريتين مرابة علي النظام المفتوح .

الصفات الانتاجية مثل العمر عند بداية الانتاج , و العمر عند نسبة انتاج 50% , و العمر عند قمة النتاج , والنسبة المئوية عند قمة الانتاج , ونسبة النفوق , وستهلاك العلف , فترة الانتاج , تم جمعها وتحليلها بوسطة استخدام اختبارات .

لمعرفة الاختلافات في النتائج المتحصل عليها من كل من الهجين التجاري والقبلي له تم استخدام اختبارات للعينة الواحدة

لا توجد اختلافات كبيرة بين الهجين التجاري والقبلي له في معظم الصفات الانتاجية . ما عدا نسبة النفوق في الفترة من بداية الانتاج وحتى نهاية الدورة الانتاجية مقارنة بالقبلي فقد وجد انها اعلي .

إستهلاك العلف في الهلى لاین أقل مقارنة باللوهمل بينما معط التحول الغذائى في الهلى لاین أفضل . وزن البيضة فى اللوهمل اكبر بينما الهلى لاین اطول في فترة الانتاج . لما نسبة النفوق فى الهلى لاین من بداية الانتاج وحتى نهاية الدورة فهي أعلى لا توجد فروقت معنوية بين كل من السلالتين والقبلي لها في العمر عند بداية الانتاج , معط الزيادة للوصول للقمة , معط النقص في الانخفاض من القمة , لسبوع القمة والمثابرة علي اعلي قمة انتاج .

هذه الدراسة اظهرت امكانية نموذج wood للتنبؤ بحجم الانتاج .

وايضا وضحت الدراسة ان السلالتين يمكنهما اعطاء نتائج جيدة تحت ظروف السودان .

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