

Blue Mountain Ostrich Nutrition E-Bulletin #81

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Potential Meat Yield of Ostrich

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Introduction

Early in 1997 I set about understanding the Growth Curve of Ostrich and began researching any data published on the subject. One of the trials that I followed with interest was The Blue Mountain Bench Mark Field Trials. One fact I found most interesting was that the results were published on a monthly basis and I sensed the clear confidence of the knowledge of the outcome of those trials, as it was clear that this was simply documenting what was happening on farms on a regular basis at the time. It has to be remembered that this in an environment when most were asking questions on how to keep birds alive, let alone predict performance.

The average liveweight at 12months of the birds in the trial was 144kgs at a feed conversion rate of 3.94:1. (Table 1) Birds slaughtered yielded in excess of 50kgs of boneless meat.

Five years after the results of that trial were published, rather than moving forward, there remains discussion throughout the industry on the ability of Ostrich to produce meat yields double the average yields today and the economics to raise such birds.

The aim of this paper is to prove why high meat yielding birds are very achievable and the commercial benefits.

Age (Mth)	Total Feed kgs	Total Gain	Conversion Ratio %	Conversion Rate
1	4.65	5.71	1.23	0.81
2	17.67	16.76	0.95	1.05
3	45.61	37.38	0.80	1.24
4	83.71	55.61	0.66	1.51
5	130.22	71.66	0.55	1.82
6	186.03	80.31	0.43	2.32
7	245.01	95.74	0.39	2.56
8	319.87	102.09	0.32	3.13
9	384.75	110.71	0.29	3.48
10	446.01	122.05	0.27	3.65
11	507.26	133.39	0.26	3.80
12	568.51	144.28	0.25	3.94

Table 1 – Blue Mountain Weight Gain Trial 1996-1997

Investigation

It was clear that such results deserved further investigation into learning the detail that lay behind these results. Three groups of birds were tracked with monthly weights using electronic digital scale. Feed consumption and cost was recorded and calculated at the end of test.

All chicks were started on Blue Mountain 20% Chick Starter Crumble for the first 6 weeks. Then, Blue Mountain 20% Grower pellets were gradually mixed with the starter crumbles changing the chicks to the Grower pellet completely by 8 weeks of age. At the age of 3-4 months, chicks were gradually introduced to the Blue Mountain

32% Feedlot Supplement that is mixed according to Blue Mountain recommendations for the Grower diet. The recommended ingredients to be mixed with the 32% Feedlot Supplement are 17% CP Alfalfa pellets and whole yellow Corn. By month 5, the chicks diet is 50% Blue Mountain Grower pellet and 50% Blue Mountain Feedlot Supplement mix.

GROUP ONE:

This was a small group of birds with superior genetic potential for slaughter birds. They were Blues and were hatched 02/06/96. Average liveweight at 12 months: 147.91kgs

GROUP TWO:

This group was average Blues with a mix of males and females. They were hatched 04/07/96. Average liveweight at 12 months: 141.10kgs

GROUP THREE:

This group is average Blues with a mix of males and females. They were hatched 22/07/96. Average liveweight at 12 months: 147.00kgs

Each group was weighed on a monthly basis. At the time of the trial many people in the industry were referencing poor growth rates in the winter months. So it was with great interest to note that the trial details referenced the test weight period from 20/12/96 through 30/01/97 including extreme cold weather at the ranch. Out of the 42 days in this period, only 10 days were above 25 degrees F (-10C) according to the ranchers record. Weather extremes reached a maximum of -50 degrees below zero F (-45C). The test weight period from 30/01/97 through 04/03/97 reported extreme cold weather at the ranch with a considerable amount of snow with lots of ice on the ground.

I contacted the farmer to learn more. He told me "everyone was stating that their birds are not growing in the winter, but I knew my birds were growing well and I set out to prove this". Throughout the trial no leg problems or feed consumption problems were reported in any of the groups. One chick was reported lost from group 2 at one month of age as a result of a cat chasing the chicks and this led to the chick's neck breaking from being trampled. During a farm visit several years later the farmer informed us that he believed the birds to be growing better in the winter months than the hot summer months. Also during that visit he produced his most recent cutting sheet from the abattoir...all the meat yields were in excess of 110lbs (50kgs).



Figure 1 - Test Chicks

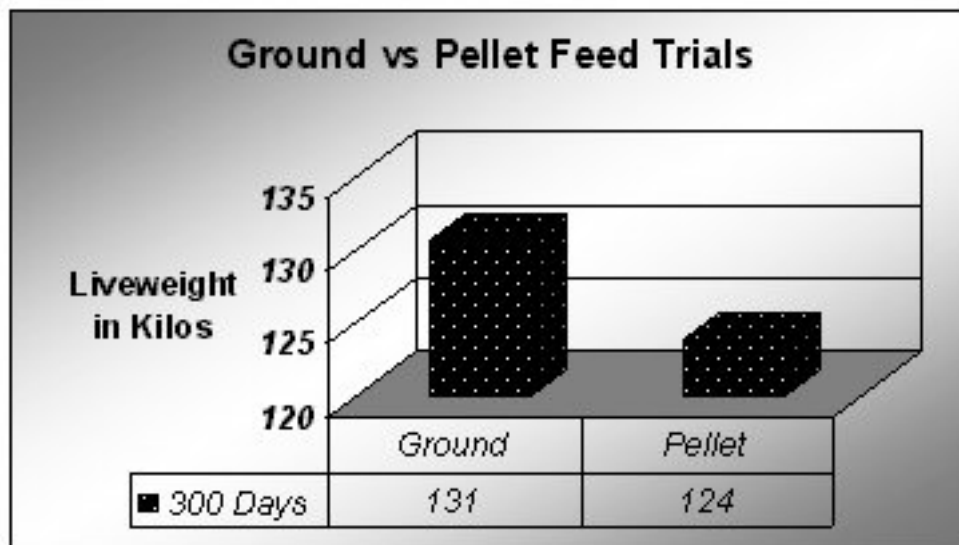


Figure 2 - Ground vs Pelleted Feed Trial

Around the same time there was a further Blue Mountain trial underway. This was to compare chicks raised on pelleted feed and ground feed as there was considerable discussion on this subject. Pelleted feed being very much easier but carrying a much higher feed costs compared to milling and mixing on farm. The results of this feed trial were also most impressive. The birds were reported to be fed exactly the same ration...one being pelleted and the other ground and mixed on farm. The birds were weighed at 300 days (10 months).

The birds on the ground feed weighed 131kgs (288lbs) and those on the pelleted feed weighed 124kgs. (273lbs) Figure 2. Again very impressive results compared to the liveweight of 95kgs that was generally being advocated throughout the industry as the ideal slaughter weight. Above all this liveweight of 95kgs was being advocated to be achieved with a 14 month slaughter age.

Further sources of growth rates that I was able to find were presented in different papers at the World Congress in 1996 and will discuss later. Another source had insufficient information to be able to work with the figures, though they showed 95kgs (210lbs) at 9mths and 100kgs (220lbs) at 12mths.

The most interesting growth rate information were those published by scientists at Stellenbosch University. Two Gompertz models were constructed, one in 1991 [1] and one in 1995 [2]. It is reported that the Gompertz has multiple uses in production and research. That it can be used as a tool to measure the standard of management and feeding compared to the potential growth of ostriches. [3] It was also reported that the potential growth under conditions of no restraint of an ostrich is depicted in the Gompertz models as opposed to actual growth results. It was argued that under practical conditions such results may not be achievable [4] and the reason given for the new, lower model, to be constructed.

Figure 3 is the result of plotting a number of different sources of data for comparative purposes. Table 2 is the figures used to establish the graph.

When the background to the information is studied, the untapped potential of Ostrich as an efficient converter of feed to meat becomes very clear.

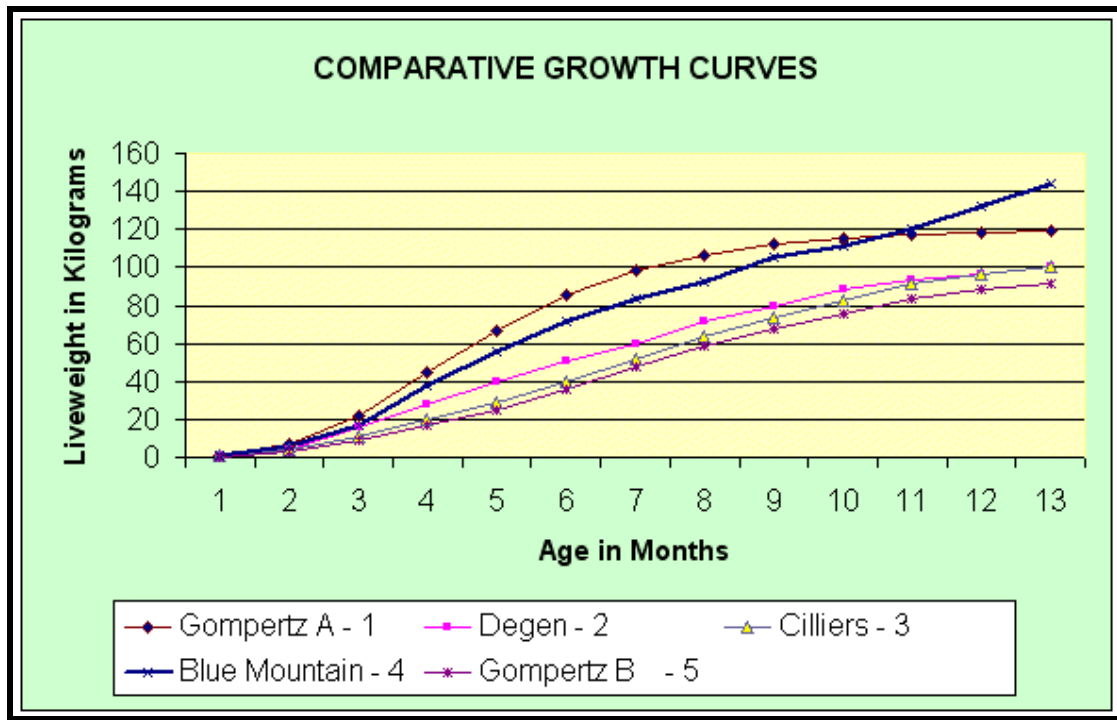


Figure 3 - Comparative Growth Curves. [5] [6] [7] [8] [9]

Analyses of Results

The first fact that caught my eye after plotting the different growth curves was the performance of the Blue Mountain Field Trial birds [8]...they not only ran close to the First Gompertz model to be constructed, they broke right through it at an age we are being told the growth normally flattens. When analysing the trial data one finds the trials took place on a commercial farm and in extremely cold weather conditions...making the statements regarding the Gompertz A model as assuming only achievable under conditions of no restraint [4] somewhat meaningless! Further investigation confirmed that these results were being replicated on a daily basis over a number of years on this and other farms dedicated to paying attention to high standards of feed management and farm management.

Days	1	2	3	4	5
30	6.5	4.00	4.00	5.7	3.3
60	21.8	15.9	11.0	16.89	9.1
90	44.3	28.16	19.5	37.31	16.6
120	66.9	39.45	28.5	55.31	25.0
150	85.3	50.45	39.5	71.20	36.2
180	98.2	59.40	52.1	83.05	47.9
210	106.8	71.16	63.4	92.41	58.2
240	112.1	79.46	73.3	105.17	67.4
270	115.3	88.81	82.4	111.72	75.8
300	117.2	93.42	91.0	120.44	83.7
330	118.1	96.46	96.3	131.81	88.6
360	119.0	99.91	99.9	143.80	91.9

Table 2 – Comparative Liveweight as per Figure 2 in Kilograms

Any one with a knowledge of production livestock understands that significant improvements in performance of other specie have been made over the past ½ century as a result of a combination of technological developments in nutrition combined with genetic improvement programs. These results were being achieved before any significant genetic improvement programs have been implemented. With an industry only a few years old in the US as was the fact at that time, these birds could not have been more than one or two generations of a genetic improvement program, if that. With an industry that was searching for answers, these results were extremely exciting to me.

The next best performance was the data published by *Degan et al* in 1991 [6], with considerably lower weight gains. With publication of the figures it was referenced that these results were achieved working with Turkey Starter and Turkey Grower Diets. We all know that Turkey producers would not use Chicken Starter and Chicken Grower diets to achieve performance...so that is a clear indication that there must be significantly improved performance possible working with rations specifically designed for Ostrich, confirmed by the BM Field Trials and other farmers following the program.

The final two curves are reported as theoretical, one created as part of a Ph.D. thesis [7] and the Gompertz B Model [9] presented at the 1998 Scientific Conference but are very typical of current general performance today. Most all references to rations achieving these levels from all sources discuss energy levels or protein levels or fibre levels. There are discussions on non-productive type of ingredients. There are rarely, if ever, discussions referencing the interrelationships between all the ingredients. There are rarely (if ever) discussions relating to the vitamin and/or minerals in the trial rations. Yet, it is published rations relating to these type of growth curves that are reproduced by animal feed companies that will have carried out no research on ostrich whatsoever. Farmers believe they are achieving the correct results as the industry itself is working to such low target figures.

Of course, using liveweight as the only guide is not sufficient as that liveweight may be carrying a great deal of fat. In 2000 the International Ostrich Association produced a meat chart. The chart also provided average muscle weights. When these are compared alongside studies carried out in the United States and compared the Blue Mountain Ostrich Meats cutting charts...one can see very significant differences.

Muscle	IOA Meat Chart Weights ¹	AOA Meat Chart Weights ²	BM Recorded Weights ³
Fan #OS1046	+/- 1500 grams	1730 – 2140 grams	2341 grams
Oyster #OS1045	+/- 300 grams	730 – 760 grams	1114 grams
Round #OS1035	+/- 1000 grams	1770 – 2090 grams	2091 grams
Outside Strip #OS1036	+/- 300 grams	545 – 635 grams	636 grams
Inside Strip #OS1050	+/- 300 grams	545 – 680 grams	818 grams

Table 3 – Comparative Muscle Weights

1 = Average South African Muscle Weights: 2 = Texas A&M Research: 3 = Average From Cutting Sheets

When comparing the muscle weights in Table 3, there are some significant variations with some muscles in excess of double the size reported on the IOA meat chart which indicates that increased live weight is for the most part increased muscle (meat production). This also confirmed that significantly higher live weights are very achievable. The implications on additional revenue achievable per bird are of course very significant indeed.

Discussion

Frequently the comment is made "we don't believe the figures" when discussing the "production goals" that Blue Mountain set. When studying the detail behind most rations currently fed as discussed above, it is very easy to understand the untapped potential of Ostrich when all things are right. The Gompertz A model can be considered as a very reasonable target to aim to achieve. From all I have learnt, it is my guess that any farmer commencing a full production program today, 10 years from now will be exceeding those targets as herd averages.

It only makes sense that if birds fed rations designed for Turkey can perform better than the targets set in the Gompertz B model, then it is clear that when fed balanced rations designed for Ostrich they can only do better, provided that person designing the rations understands Ostrich and the farmer or mill mixes that feed correctly and the highest standards of feed management are practiced. When birds are producing as well as the Gompertz A model and continuing putting on muscle at a time most consider the curve normally flattens...this was a further clue to me that there was considerable knowledge and understanding of Ostrich behind the design of those Blue Mountain rations.



Figure 4 - Young Test Bird at Weighing. Note the tremendous height and width of Chick

My investigations then took me onto slaughter lines, and there it is very clear to see birds demonstrating many symptoms of nutritional deficiencies...such as livers demonstrating a range of disorders, poorly developed hearts, minimal muscle development and in some cases muscle deterioration, white muscle disease and so on. Deficiencies have to be severe for them to be visible. Modern nutritional thinking has moved beyond seeing nutritional adequacy as simply freedom from symptoms if farmers are to make good returns. [10] It is clear that if birds presently demonstrate symptoms of nutritional deficiencies, it must be possible to considerably improve growth rates and feed conversion in the future if the nutritional deficiencies are corrected.

Chick mortality is another area that provides clear proof that faster growth rates and feed conversion are very achievable. When autopsying chicks one sees a significant variation in internal organ development and yolk sac conditions. [11] [12] This is further evidence that when these are eliminated significant improvements in growth rates and feed conversion must be very achievable and I have proven this to myself.

Over the years I have seen many different rations that are reported to be for Ostrich. Most all are based on poultry style rations, contain non-productive feed ingredients and fall well below the nutrient values of the rations reported in the BM Field Trials. Many rations also contain premixes designed for poultry or beef cattle. Others are copies of different published data, sometimes with serious errors in the copying of that data, other times with no understanding of the detail behind the published data. Further evidence to me of the untapped potential as no professional livestock producer would consider feeding rations based on premixes designed for another specie or try to copy data without knowing the parameters behind that data.

It is clear that some birds are genetically more capable of achieving higher meat yields than others as genetics obviously play an important role. When my own African Blacks have been viewed, the comment has been "oh, but you must have better genetics" when in fact nothing could be further from the truth. The first Blues and Reds that I ever saw I found smaller than my African Blacks in South Africa, before I started to work with the BM rations. Thus further proving the potential when nutritional deficiencies are removed from ostrich production and genetic improvement programs implemented.



Figure 5 - Daryl Holle and 16 month old Barney (photo taken 1991)

Figure 5 is a 16mth old bird that was purchased in 1990 as a scrawny 3 month chick as part of a batch of first test birds. Daryl Holle is a large-framed 6 feet, 3 inches in height (190 cm) so one can see how large this test bird actually was. It was the results that Daryl was achieving with these trial birds, and farmers witnessing the tremendous growth that resulted in the birth of Blue Mountain Feeds.

Conclusion

What has astounded me during my investigations is the perceived “assumption” that many of these clear symptoms of deficiencies are taken as “normal”. Even today, with all the clear evidence that certain things may be “usual” as they are seen so often, but most certainly are not “normal”, there continues to be a debate on some issues that are basic common sense in livestock production.

The other approach was that from a nutritional point of view I found that Daryl Holle looks at the symptoms...be it leg deformities, poor egg quality, low fertility, liver problems or whatever...he then will identify the cause/deficiency of those symptoms and the effect. The causes and/or deficiencies being the same in most all species...just different methods to fix those deficiencies as each specie has its unique requirements and tolerances. From there he determines what is required to correct that problem. It is then important to understand how the remedy affects everything else to avoid new problems arising.

I also found that Daryl Holle went a great deal further in that he was discussing “production” goals and “performance” characteristics in the design of rations and not simply keeping birds alive and/or free of deficiency symptoms.

All the above, combined with my personal experiences, proves beyond any doubt the untapped production **potential** of ostrich.

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[1] Du Preez *et al* Stellenbosch University 1992

[2] Cilliers *et al* Stellenbosch University 1995

[3] Feeding and Feed Management, W.A. Smith and J.Sales, Stellenbosch University, Practical Guide for Ostrich Management and Ostrich Products Page 11 1995

[4] Nutrition of the Ostrich for Meat and Leather, J.P. Hayes, S.C. Cilliers, and J.J. Du Preez European Ostrich Association World Congress, 1996

[5] Gompertz 1 - Gompertz Model, Nutrition of the Ostrich for Meat and Leather, J.P. Hayes, S.C. Cilliers, and J.J. Du Preez European Ostrich Association World Congress, 1996

[6] Degan 2 - Degan *et al* Animal Production. 52,225-232 1991 Referenced B.D.H.van Niekerk and U T Muller, Maximising Growth of the Ostrich for Slaughter, European Ostrich Association World Congress, 1996

[7] Cilliers 3 - S.C. Cilliers, University of Stellenbosch, Ph.D. Thesis 1995. Referenced B.D.H.van Niekerk and U T Muller, Maximising Growth of the Ostrich for Slaughter, European Ostrich Association World Congress, 1996

[8] Blue Mountain 4 - Blue Mountain Farm Benchmark Trial, Carried out by Darrell Wagoner, Oakridge Ostrich Farm, Hayes, Kansas, USA. 1996-1997

[9] Gompertz 5 - F.C. Cilliers Determination of Metabolisable Energy and Amino Acid Requirements for Maintenance and Growth of Ostriches, Ratite Scientific Conference, 1998

[10] Optimum Vitamin Nutrition for Optimum Health and Performance in Nutrafacts - Vol.3 No.2 1999

[11] D.G. Holle – Yellow Livers on Baby Chicks are not Normal

[12] F.V. Benson, D.G. Holle – Nutrition and Health, Curso Especializado en Producción de Avestruces nutrición – manejo y patología, UST, Santiago, Chile 2001