

By the Book?:  
Farming Manuals, Animal Breeding and the  
English 'Agricultural Revolution'

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## ABSTRACT

English pastoral husbandry has been largely neglected by previous historians. It is generally agreed that the mid-eighteenth century saw a revolution in breeding practices, moving livestock husbandry from hopeless confusion to a controlled, 'scientific' selection for marketable traits. The academicians, mostly economic historians, who have developed this model of pastoral history rely heavily upon farming manuals dating from the fifteenth to the eighteenth centuries for evidence of the changes they claim to perceive. Agricultural manuals are complex literary documents. However, in the current historiography, the manuals are quoted as simple records of contemporaneous agricultural practice, the intricacies of authorship, audience and motive for publication being almost entirely ignored. A critical survey of the manuals which deal with pastoral husbandry beginning with the thirteenth, rather than the fifteenth, century reveals flaws in the use which has been made of the manuals and, therefore, in the conclusions which have been drawn from them.

In order to accomplish a reconsideration of English pastoral husbandry, it is necessary to reincorporate the extant medieval farming manuals and to examine all didactic agricultural texts as representative of a single genre. Discussion of livestock husbandry was carried out in terms of generation and nutrition of animals. Therefore, any intimations of procedural changes or scientific influence upon breeding and feeding in the discussions of manuals which deal most extensively with pastoral husbandry should be noted as of particular interest. Finally,

the manuals must be considered within a social context. It is here that the interaction of science and agriculture becomes particularly important, though as a tool for understanding the manuals as documents rather than solely as the motor for late eighteenth-century changes in livestock husbandry.

Such an analysis reveals an amazing continuity of actual information in the agricultural manual genre. There are no changes in the depictions of practices of breeding and feeding. However, especially in the late seventeenth and eighteenth century texts, a preoccupation with attracting the attention of institutional science, particularly the Royal Society, emerges as a new trend. Yet there is no indication in the textual record that livestock husbandry was ever affected by 'Natural Philosophy'. Far from simply recording contemporary practice, agricultural manuals, especially those which expressed a desire to ally with institutional science, reveal themselves more as vehicles for their authors' social aspirations than as exemplars of agricultural practice. Once this is recognized, the prevailing models of pastoral husbandry lose credibility. Eighteenth-century animal breeding was no more nor less 'scientific' or intellectually sophisticated than preceeding breeding programs.

In short, the use of farming manuals to corroborate economic models of agrarian development has been, at best, somewhat spurious. Studying livestock husbandry and its relationship to institutional science in medieval and early modern England can be peculiarly helpful in assisting to rectify this error.

...there is something that inspires awe in the thought that since the surface of the earth became capable of supporting life from generation to generation for millions upon millions of years creatures have come into existence to end at last upon a plate of crushed ice or on a silver grill.

...I do not know how anyone can look upon a lamb cutlet without thoughts too deep for tears: here man himself has taken a hand and the history of the race is bound up with the tender morsel on your plate.

W. Somerset Maugham  
'Virtue'

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## INTRODUCTION

Considerations of the role of animal breeding in English history usually focus on the mid-eighteenth century. Historians and agriculturalists are virtually unanimous in their opinion that the work of men like Robert Bakewell, often called the forerunner of 'scientific' breeding, was the first major, controlled effort to change animal characteristics to meet specific market demands. This view is derived largely from an insufficiently critical reading of a large corpus of contemporaneous agricultural manuals. Modern historians are given to citing didactic agricultural treatises<sup>1</sup> as examples of past agrarian practice. Whatever the value of these manuals for the history of arable production, the estimation of their merit as a source for the history of animal breeding practices is in need of revision. In particular, an understanding of the manuals requires greater attention to, and a more critical analysis of, the nature and social context of the genre of agricultural literature. In general, the study of animal husbandry has been undervalued by historians, agricultural and otherwise. Glance at the indices of the major journals in agricultural and economic his-

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<sup>1</sup>The terms 'agricultural manual', 'didactic agricultural treatise' and 'farming manual' are all used to refer to treatises which deal with the management, administrative or physical, of the arable or pastoral products of land and the interaction of that land with the animals that live on it.

tory<sup>2</sup> and this point becomes immediately evident. Such a predilection is not incomprehensible. Economic and agricultural historians depend largely upon measurable data. The arable sector of the agrarian economy is more quantifiable and more easily reduced to formulae. The manuals themselves have served to support this bias, being heavily weighted toward arable husbandry, rather than descriptions of pastoral farming.

Kathleen Biddick, a specialist in medieval pastoral and economic history, has recently attacked the 'subordinate, dependent position' accorded to pastoral husbandry in prevailing models of medieval economic development.<sup>3</sup> Her discussion of the limitations and misconceptions placed on the study of pastoral husbandry by the prevalence of evolutionary models is also applicable to the agrarian history of the early modern era. She states that:

In such evolutionary schemata, pastoralism -- things having to do with animals -- preceded cereal agriculture. An abiding identification of the pastoral with the primitive and marginal, and often with women's work, short-circuited historical study of European pastoral husbandry. Historians, as inheritors of this tradition, have rendered European pastoral economies historically invisible and "other" so as to sustain linear narratives of European progress.<sup>4</sup>

Much time could be spent in speculating on the cause of this bias. More productively, an examination of the nature of the English

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<sup>2</sup>For example, articles dealing extensively or exclusively with any aspect of pastoral husbandry formed only tiny percentages of the total articles published in the following journals over the decade of the 1980s: The Agricultural History Review, 13 of 110=11.8%; Agricultural History, 24 of 302=7.9%; The Economic History Review, 5 of 153=3.3%; The Journal of Economic History, 2 of 279=0.7%.

<sup>3</sup>Kathleen Biddick. The Other Economy (Berkeley: University of California Press, 1989), p. xv.

<sup>4</sup>Ibid., p. 1.



farming literature from the period of the 'Agricultural Revolution' can shed some light on this subject. The manuals cover the entire period of the so-called 'revolution', from c. 1500 - 1800.<sup>5</sup> Animal husbandry, though often neglected in the discussion of the agricultural innovations grouped together under the rubric 'agricultural revolution', was an integral part of the changes which took place.

Economic historians stand virtually alone in their recognition of the value of agricultural literature as a source. Unfortunately, the restrictive scope of economic history has hampered the most beneficial exploitation of the farming manuals. The line between economic and agricultural history is a fine one and many of the same restrictions apply to both fields.<sup>6</sup> An examination of certain aspects of the agricultural manual genre will assist in clarifying much that is stultifying in economic analysis. Use of economic models deals admirably with solving some historical problems, but there is no room in such models for an analysis of societal influences on the didactic literature which is so often used as a source for agricultural history. A new approach, free of the inherent biases<sup>7</sup> which economic discourse

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<sup>5</sup>The term 'agricultural revolution' is commonly applied to a series of geographically and temporally diverse innovations in farming practices, chiefly arable, which combined to increase dramatically the productivity, potential and actual, of English agriculture. Please see also below pp. 10-11.

<sup>6</sup>Please see esp.: W. G. Hoskins. 'Regional Farming in England' Agricultural History Review 2 (1954), pp. 3-11. In this reprinted address to the then newly founded British Agricultural History Society, Hoskins defines agricultural historians as the children of economic history, becoming 'independent, while at the same time maintaining amicable relations with the parents that begat us' (p. 3).

<sup>7</sup>For excellent discussions of this subject see: Biddick. The Other Economy and David Grigg. The Dynamics of Agricultural Change: The Historical Experience (London: Hutchinson, 1982).

tends to suffer from, is necessary if this misapprehension is to be corrected.

Historians of science and technology can also learn much from a study of farming manuals. While the history of science and economic history are not academic fields which are traditionally open to a great deal of interchange, farming manuals provide a common ground for these types of research. Historians of science have tended to ignore agriculture and focus, instead, on the 'hard' sciences, concerning themselves solely with modern 'scientific' farming. It has often been assumed that the late eighteenth century formations of regional agricultural societies and, later, the Board of Agriculture, somehow served to link the worlds of science<sup>8</sup> and agriculture, thus allowing 'scientific' farming to increase farm production radically.<sup>9</sup> Again, a re-evaluation of farming manuals can provide a rather different picture. A study of theories of generation and nutrition in agricultural texts serves as a useful vehicle through which to unravel complexities in the genre which have hitherto gone largely unrecognized. It becomes apparent that they

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<sup>8</sup>Unless otherwise defined, 'science' and 'institutional science' are used interchangeably to refer to the academic enquiries of the universities and, later, the Royal Society. The 'world of agriculture' is more difficult to define. It can be considered broadly as the thoughts and actions of all those directly (and especially physically) concerned with the working of the land.

<sup>9</sup>For a most explicit statement of this view see: M. E. Seebohm (née M.E. Christie). The Evolution of the English Farm (2nd ed.) (London: George Allen & Unwin, Ltd., 1952 (1927)), esp. p. 361.

are not uncomplicated exemplars of agricultural practice, as they are usually defined in current historiography.<sup>10</sup>

Of course, it is not possible to survey all texts which fall roughly within the limits of agricultural manuals. Certain temporal and conceptual restrictions must be imposed. To limit a study of animal breeding to the eighteenth century and Robert Bakewell is to risk repeating previous errors. English agricultural manuals have a long history, stretching back to the thirteenth century. They must all be read as representative of a single genre. The 'medieval' and 'early modern' designations are particularly false and obfuscating when applied to agricultural practice. Though it is necessary to look forward from the eighteenth century, this is not as critical as the recognition of previous centuries' work. The early nineteenth century saw agriculture subsumed to a large degree by new institutions for the control of agricultural practices in the form of regional societies and the Board for Agriculture. Certainly, a new super-structure was applied to a diffuse and largely individualistic practice. Some sort of evolution of farming as an endeavour appears to have culminated at the end of the eighteenth century. It is not so apparent that any significant change in agricultural practice - any true improvement - was made at that point. Just as the formation of a trade union does not immediately change the nature of the trade itself, agricultural procedures should

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<sup>10</sup>The clearest example of this rather cavalier attitude is to be found in: Eric Kerridge. The Agricultural Revolution (London: George Allen & Unwin, Ltd., 1967). Kerridge supplies huge footnotes brimming with references to farming manuals with a fine disregard for their date of publication, apparent purpose, audience, influence, and even the originality of their content.

not be assumed to have spontaneously mutated under the aegis of the new societies and Board.

Historians of agriculture tend to define improvement in livestock, in the late eighteenth century and otherwise, as an increase in genetic potential, expressed in increased size of skeleton and musculature or measurable output of wool or milk, while tending to undervalue somewhat the role of nutrition in the improving process. Carcase size and weight are particularly popular. Weights are a nicely quantifiable sort of evidence, yet to use them assumes that all livestock improvement is an increase in size. There are two problems with this. First, even if the available figures for these variables were absolutely accurate, there is no way of determining how much of that weight increase was due solely to better nutrition, allowing latent genetic ability to express itself fully. Second, 'improvement' as it is defined in the manuals could simply have had a different definition before, even during, the eighteenth century. For example, sheep carcase weights went up in the 1700s, yet the breeds were, by some terms of reference, devolving as improved nutrition made wool coarser. Current agriculture has available systems of explanation which allow a differentiation of the effects of genotype and environment, especially feeding, on the mature product of a breeding strategy. This distinction was not always possible or, indeed, necessary. In searching that standard source for agricultural history, the farming manual, for evidence of improvements in animal breeding, therefore, theories of generation and nutrition are subjects of particular interest. Any discussion of animal growth or phenotype was expressed in the manuals in terms of

breeding and feeding, a binomial appellation for a single subject. The little extant work on pre-modern English pastoral husbandry has assumed that the written record reflects contemporaneous practice of generation and nutrition and that this practice was pre-scientific in nature. When these two assumptions are queried, an entirely different depiction of pastoral husbandry can emerge.

In short, the picture which develops from an analysis carried out under the restrictions outlined above is one of a dynamic agricultural sector developing and manipulating its own system of causal explanation. The theorizing of scientists was not needed to produce agricultural change.

## Chapter 1

## RECONSTRUCTED PRACTICE:

## A Review of the Secondary Literature

Of the enormous amount of work, both learned and antiquarian, which has been done on past agricultural practices in England, most centres upon the period now known as the 'Agricultural Revolution'. Only a tiny fraction of that work deals specifically with stock-keeping. Kathleen Biddick's postulations regarding the lack of interest in medieval pastoral history speak to the early modern era as well.<sup>11</sup> As animal husbandry is a neglected subject, so has one of the chief sources for agricultural history been similarly glossed over by previous students of agriculture and agrarian change. Farming manuals are often cited as authoritative sources, yet their interpretation has been sketchy at best. It is possible that these two subjects, both undervalued, can be combined to their mutual benefit, rather than the detrimental pairings which have occurred in previous literature.

Any review of secondary literature dealing with topics in English agricultural history must begin with the standard secondary works which deal with all aspects of farm production. Two texts stand out as classics in the tradition of agricultural history. Both published in the first decades of the twentieth century, Lord Ernle's

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<sup>11</sup>Biddick. The Other Economy, pp. 1-2.

English Farming Past and Present and M.E. Seebohm's Evolution of the English Farm are comprehensive works designed to glorify the practice of farming and exhibit England's proficiency in agriculture and food production. Of the two, Ernle's book is more concerned with the economic aspects of farm production, limited in focus to the second millenium A.D. Seebohm is rather more interested in the social side of the agrarian enterprise and surveys agricultural practice in Britain from the Neolithic era to the late nineteenth century. Both books utilize farming manuals as a source for agricultural practice. Unfortunately, in both cases, few manuals are used and no consideration is given to the context of the genre, only the content. This leads both authors to the conclusion that the eighteenth century saw some sort of revolution in stock-breeding techniques. To quote Seebohm:

In the farm-yard *stock* an extraordinary change for the better took place, due to the fact that for the first time the modern principles of breeding were at length carefully evolved by the efforts of Bakewell of Dishley and other farmers of his ilk.<sup>12</sup>

This statement is bolstered with figures for weights of carcasses at the Smithfield markets at the beginning and end of the century. Interestingly enough, Ernle uses these same figures to demonstrate livestock improvement over the course of the eighteenth century, yet notes that Sir John Sinclair, the compiler of these figures is not 'always a reliable witness'.<sup>13</sup> Though Ernle is the more critical author in some ways, he is also more responsible for the insistence that

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<sup>12</sup>M. E. Seebohm. The Evolution of the English Farm, p. 267.  
Note: Italics are Seebohm's.

<sup>13</sup>Lord Ernle. English Farming: Past and Present (6th ed.) (London: Frank Cass & Co., Ltd., 1936 <1912>), p. 188.

Bakewell was a revolutionary figure in animal breeding. Ernle characterizes pre-Bakewellian animal husbandry thus: 'Stock-breeding, as applied to both cattle and sheep, was the haphazard union of nobody's son with everybody's daughter.'<sup>14</sup> Ranking his work above that of Jethro Tull and 'Turnip' Townsend, two heroes of arable innovation, Ernle states that 'the necessary revolution in the breeding and rearing of stock was mainly the work of Robert Bakewell (1725-95).'<sup>15</sup>

The texts of Ernle and Seeböhm have their faults, yet they do, at least, recognize the importance of stock-breeding. This is less true of the more recent works in English agricultural history. The majesterial Agrarian History of England and Wales has very little to say on the subject of stock-breeding, remaining chiefly concerned with the direct fruits of the land and not its secondary products.

Animal husbandry has been similarly over-looked in the vast secondary literature focussed specifically on the so-called 'Agricultural Revolution' in England. The two seminal works for this period both appeared in the mid-nineteen sixties. Eric Kerridge and the authorial team of J. D. Chambers and G. E. Mingay both chose to title their works The Agricultural Revolution. In many ways, the two books are similar. Both agree that the series of geographically and temporally diverse innovations which combined to form the 'revolution' were developed over many years. Both agree that the list of innovations includes variously convertible husbandry, fen drainage, increased use of

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<sup>14</sup>Ibid., p. 181.

<sup>15</sup>Ibid., p. 176. Ernle relies heavily upon the reporting of Arthur Young for his interpretation of Bakewell's importance.



additive fertilizers, 'floating' of water meadows and the introduction of new field fodder crops. While Kerridge sees the entire period of the innovatory process as constituting the period of revolution, Mingay and Chambers limit their revolutionary period to the years 1750-1880. For Kerridge, the inception of a new idea or practice is the revolutionary moment. Mingay and Chambers prefer to see the production of tangible results -- a radical increase in agrarian output -- as defining the period of revolution. Both Agricultural Revolutions work from the same data.<sup>16</sup> Both books cite farming manuals from the period in question and these form virtually the only sources for pastoral husbandry. Kerridge is particularly given to quoting and referring to early modern agricultural manuals.<sup>17</sup> However, even Kerridge does not exhibit the critical interest in the manuals which should be accorded them. The evolutionary model condemned by Kathleen Biddick is at work here too. Both texts assume that farming manuals are uncomplicated texts with a clear purpose and accept the material found on their pages as representative of practice. These two preeminent works on the 'agricultural revolution' recognize the importance of animal husbandry to the integrated farming of northern Europe, yet see pastoral innovations

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<sup>16</sup>Indeed, Mingay and Chambers thank Kerridge for the use of his unpublished data for the 'earlier changes on which the agricultural revolution was based'. G. E. Mingay and J. D. Chambers. The Agricultural Revolution, 1750-1880 (New York: Schocken Books, 1966), p. vi.

<sup>17</sup>This is partly an artifact of the intended purpose of the two works. Mingay and Chambers candidly admit that their book is meant as an over-view, to be used as a survey text, rather than a reference work. See Preface, p. v. Kerridge's effort is also a survey, but a more detailed one, containing extensive references to primary and secondary sources. Mingay and Chambers provide only truncated lists of secondary sources as 'Suggested Reading'.

simply as an outcome of arable production, rather than a motivator.

Kerridge has the most explicit statement of this underlying philosophy:

...the innovations of the agricultural revolution were designed first and foremost to increase the volume and range of fodder and forage crops turned out by English farmers; and this being so, it was the natural order of things that farm livestock should undergo changes, and improvements be effected upon the original breeds of sheep, cattle and horses.<sup>18</sup>

The reduction of improvements in animal-breeding to the status of 'natural order' is unfortunate, denying by implication intentional improvement of livestock. Kerridge does, at least, provide a chapter on developments in stock-breeding, though limiting his discussion primarily to the work of Robert Bakewell. Mingay and Chambers similarly succumb to the attractions of Bakewell and his contemporaries. In both cases, the manual references used to support the argument that Robert Bakewell was a pivotal figure date from the very late eighteenth century. There is no attempt to determine whether Bakewell was heir to a continuum of practice, evolved over an extended period of time. Instead, it is assumed that revolutionary changes caused the first truly conscious manipulation of phenotypic and metabolic traits. In other words, the nineteen-sixties' version of agricultural change bears a strong resemblance to the views propounded in Seeborn and Ernle. Though ostensibly stripped of the nationalistic elements which litter their predecessor's texts, and couched in a discursive style of an apparently more analytical school of thought, a remarkably similar vision of the agrarian history of England remains the norm.

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<sup>18</sup>Kerridge. The Agricultural Revolution, p. 311.

In this vision, the figure illuminated in the stock-breeding spot-light is the portly outline of Robert Bakewell. Though the hero of much secondary literature, he has been the subject of only one biography.<sup>19</sup> H. C. Pawson's Robert Bakewell: Pioneer Livestock Breeder is a generous examination of Bakewell's achievement. Though Pawson, Professor of Agriculture at the University of Durham, was wooed by the charm which made Bakewell such a success, he emphasized aspects of Bakewell's career which receive less notice in the standard historiography. The brilliance of his showmanship is highlighted, with Bakewell's adept promotion of his own stock esteemed a major contribution to his prominence, both immediate and lasting, as an animal breeder. Bakewell's practice of hiring out stud rams and bulls is detailed and examined as a practical experiment in progeny testing: 'He was thus enabled to study their respective performances in other herds and flocks and under different environmental conditions'.<sup>20</sup> Pawson claims that the system which he has characterized as 'progeny testing' could only be fully appreciated after the advent of Mendelian genetics. The exemplary management of Dishley Grange, Bakewell's estate, is examined. The feeding patterns used at Dishley, an element commonly ignored by historians, are evaluated and considered as an integrated part of the improving process, for Pawson indicates that he believes genetic potential to have been inherent in English livestock before Bakewell, but suppressed by inferior foodstuffs. Pawson is not of the

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<sup>19</sup>H. Cecil Pawson. Robert Bakewell: Pioneer Livestock Breeder (London: Crosby Lockwood & Sons, Ltd., 1957).

<sup>20</sup>Ibid., p. 68.

opinion that Bakewell was the sole motor for a revolution in breeding practices. He is careful to make it quite clear that Dishley Grange was only one centre of improvement and that other men, before and after used similar breeding techniques. However, it is Pawson's evaluation of Bakewell as a breeder who applied principles such as 'progeny testing', an important component of modern scientific breeding, which adds a new dimension to the picture.

If historians are to be allowed to write the history of agriculture with little or no knowledge of agricultural practice, then agriculturalists who know little of history must also be allowed to express their interpretation of the development of agricultural production over time. Agriculturalists are generally as reluctant as professional historians to define Bakewell's work as scientific. Both professions regularly define the early modern period as pre-scientific. This view is perpetuated by two twentieth-century histories of agriculture, both written by agriculturalists. F. H. A. Marshall and John Hammond, both Cambridge animal physiologists, confined their (admittedly brief) study to a 'pre-scientific' period extending from c. 1750 to the early nineteenth century.<sup>21</sup> They recognized a lack of empirical scientific study, even well into the twentieth century, as what they termed a hindrance to efficient agriculture. Sir John Russell, a long-time director of the Rothamsted Experimental Station, began his study with the year 1620, though seeing the practice of the years between 1620

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<sup>21</sup>F. H. A. Marshall and John Hammond. The Science of Animal Breeding in Britain (London: Longmans, Green & Co., for The British Council, 1946).

and 1800 as formative, rather than actually scientific.<sup>22</sup> Russell's book in particular contains strands of information much needed in the historiography of the 'agricultural revolution', illuminating possible connections between agricultural authors and institutional science.<sup>23</sup>

Another group of agricultural authors, those modern manualists who produce textbooks, often include historical introductions which stress the importance of 'scientific' method as applied to farming. Their definition of 'science' is, though, often different from that expressed by professional historians. For example, one text defines the 'science' of animal husbandry as originating with the domestication of animals in the New Stone Age (8,000 - 6,000 B.C.).<sup>24</sup> Obviously, 'science' is, in this case, very loosely defined and does not refer to a modern, institutional mode of scientific discourse.

The introductions to agricultural textbooks are governed by the need to condense thousands of years of history into a few short pages. Agricultural historians have the luxury of an entire genre in which to discuss and debate the history of arable and pastoral production. Of all that work which has previously been done on agricultural change in England, many of the basic tenets are derived from the use of farming manuals as a source for practice. Two authors, Fussell and McDonald, have compiled what are essentially annotated bibliographies of farming

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<sup>22</sup>Sir E. John Russell. A History of Agricultural Science in Great Britain, 1620-1954 (London: George Allen & Unwin Ltd., 1966).

<sup>23</sup>please see below, p. 72.

<sup>24</sup>James Blakely and David H. Bade. The Science of Animal Husbandry (Reston, Virginia: Reston Publishing Company, Inc., 1985), p. 3.

manuals.<sup>25</sup> These are useful in that they map republications and plagiarisms. However, though authors are loosely grouped by publication date and/or topic, no startling trends appear from such groupings and there is no attempt to place the manuals within the society which generated them and to which they were addressed. Both men include biographical details of the authors they mention, yet questions of readership and influence are ignored. It is simply assumed that the books were read and that they are representative of the practices current at their time of publication. Fussell and MacDonald are not alone in this. Few attempts have been made to analyze the didactic treatises as to content and effect. It has been unanimously assumed that the manuals were written for the express purpose of disseminating new ideas and practices. The use of the manuals by agricultural and economic historians implies their acceptance as influential at the time of publication. Indeed, inter-textual references to other works in the genre seem to support the idea of a network of didactic treatises, extensively read, compared and used by a group of people. Joan Thirsk, arguably the premier contemporary agricultural historian, has made the only real attempt to argue for, or explain the thesis that, practice was influenced by the advice of the manuals and their authors. She assumes the manuals 'did not stand aloof from farming practice'. As examples, she cites textual references to a number of plant crops 'not yet seriously tried in England' and praises the manual authors for 'doing their best to match

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<sup>25</sup>Donald MacDonald. Agricultural Writers from Sir Walter of Henley to Arthur Young (New York: Burt Franklin <reprint>, 1968 <1908>) and: G. E. Fussell. The Old English Farming Books from Fitzherbert to Tull, 1523 to 1730 (London: Crosby Lockwood & Son, Ltd., 1947) and More Old English Farming Books (London: Crosby Lockwood & Son, 1950).

theory with practice'.<sup>26</sup> Thirsk further supports her assertions by comparing farming manuals with the literature of the gardeners and botanists. While there are similarities in the format of the manuals from both of these traditions, there are few indications that gardening and botany ever influenced the course of agricultural change in a fundamental way. There was a distinct difference in social status between gardeners and farmers. Thirsk makes no attempt to recognize or deal with this difference and its effect upon the manual tradition. In doing so, she misses the opportunity to mention and account for the great number of barriers hindering a transmission of techniques from a printed medium to working agriculturalists. Without a definition of which group, authors or practitioners, act as the motive force and enabler of agrarian innovation, there can be no assumption that the manual tradition had any bearing on practice.

It should come as no surprise that Thirsk draws her conclusions based on the arable sector. A glance at trends in pastoral husbandry and its didactic literature gives cause to doubt the facile assumption that the manuals are what they appear to be and do what they purport to do. In Land, Labour and Economic Discourse, Keith Tribe goes beyond this simple interpretation and provides a very different approach to the agricultural treatises of the seventeenth and eighteenth centuries. His purpose is not to reconstruct agricultural practice. Rather, he wishes to convince his readers that:

by reading these works as literary products rather than as farming books, some different conclusions can be drawn, conclusions which

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<sup>26</sup>Joan Thirsk. 'Agricultural Innovations and Their Dispersal', The Agrarian History of England and Wales <vol. 5:2>. Joan Thirsk, ed. (Cambridge: Cambridge University Press, 1985, pp. 533-89), p. 536.

enable us to measure the discursive space which separates the 'seventeenth' from the 'eighteenth' century.<sup>27</sup>

In his attempt to chart changes in modes of economic discourse, Tribe, like so many others, fails to examine the social context and literary tradition of the manuals upon whose content he relies. The break in discursive style which he observes in the early 1700s undeniably exists. Tribe claims to see a change toward an 'economic' view of land. Certainly many of the eighteenth-century manuals deal more specifically with profit than their immediate predecessors. This, though, is not a new phenomenon. The extant medieval texts reveal the same sort of interest in management for the sake of taking profit from the land. Tribe mentions the growing interest in Natural Philosophy in the eighteenth-century texts and cites this as evidence for a new, objective attitude toward the land and its products. The transition in the philosophical conceptualization of the land may well have occurred; however, other factors were at work.<sup>28</sup>

The most recent, and very nearly the only, book on the history of animal breeding in England, is marred by the same disinterest in the Middle Ages which detracts from Tribe's unique study. Nicholas Russell's Like Engendr'ing Like,<sup>29</sup> investigates English animal breeding practice in the early modern era. Russell makes extensive use of agricultural manuals published after 1500. Unfortunately, his investi-

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<sup>27</sup>Keith Tribe. Land, Labour and Economic Discourse (London: Routledge & Kegan Paul, 1978), p. 54.

<sup>28</sup>Please see below, Chapter 3, esp. p. 70ff.

<sup>29</sup>Nicholas Russell. Like Engendr'ing Like (Cambridge: Cambridge University Press, 1986).



gation is led astray by the very lack of attention to the nature of these manuals that has flawed much other scholarship. Though more attentive than some, he fails to account for his complete lack of attention to medieval agriculture. The extant medieval agricultural manuals are totally ignored. Also, although Russell complains of the lack of manorial records between 1500 and 1650, yet he fails to mention or make use of the relative wealth of just such information for the later Middle Ages. This failure is important for his discussion of horse breeding. Though Russell, to do him justice, makes it clear that his intent is not to study the whole history of British livestock husbandry, a task ably accomplished elsewhere<sup>30</sup>, his complete disregard for all trends in medieval agriculture, particularly selective breeding campaigns, throws serious doubt upon some of his conclusions.<sup>31</sup> Although Russell takes a balanced approach to Bakewell, he still sees the proprietor of Dishley Grange as a pivotal figure. In Russell's opinion, Bakewell's achievement was less in the success of his own methods than in the popularization he gave to inbreeding practices current in racehorse-breeding circles since at least the late seventeenth century.<sup>32</sup> However, Russell, who self-admittedly set out to find 'a measurable increase in the productivity of commercially bred livestock',<sup>33</sup> comes to the less than surprising conclusion that Bakewell was a herald of the future and that

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<sup>30</sup>See especially: Robert Trow-Smith. A History of British Livestock Husbandry (2 vol.) (London: Routledge & Kegan Paul, 1957).

<sup>31</sup>Please see below, p. 78-9.

<sup>32</sup>Russell. Like Engend'ring Like, p. 219.

<sup>33</sup>Ibid., p. 216.

modern breeding strategies could not have developed without him.

As mentioned, there is one text which undertook to survey the entire history of British livestock husbandry from the Neolithic period to the beginning of this century. Robert Trow-Smith, the author of this impressive work, has seldom been accorded the recognition that he deserves. Contemporary authors tend to refer to him as out-dated or antiquarian, or simply ignore him altogether. This is unfortunate. The History of British Livestock Husbandry serves to focus the host of inconsistencies and lack of analysis which characterizes so many of the works discussed above. Though Trow-Smith worked from the same data as the other authors, he developed an image of livestock-breeding as a continuum. While Bakewell is a figure of importance to Trow-Smith, he does not become the single icon in centuries of wallowing incapability and rustic ignorance. Trow-Smith's balanced and reasonable text is untainted by the necessity of including an 'agricultural revolution'. Kerridge and Mingay and Chambers use Trow-Smith's work in their respective constructions of the 'revolution', but are forced by their own arguments to ignore much that is most valuable in the book. As Robert Bakewell has become the symbolic founder of controlled livestock husbandry, Trow-Smith's evaluation of Bakewell should be particularly illustrative of his unique interpretation of England's pastoral history. And indeed, the very chapter dedicated to an exploration of Bakewell's work begins with a reminder that the 'work of livestock improvement has been coterminous with domesticated livestock husbandry almost from its beginnings'.<sup>34</sup> After reminding his reader of great periods of animal

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<sup>34</sup>Trow-Smith. A History of British Livestock Husbandry, p. 45.

improvement in classical Greece and Rome and medieval England, Spain and the Low Countries, Trow-Smith states that:

Beside the men of vision, ambition and avarice which marked out these periods as phenomenal, there ran the patient, unchronicled and relatively modest achievements of a host of minor improvers.<sup>35</sup>

This is not to say that Bakewell is reduced to a figure of no importance. In the final summation, Trow-Smith's homage to the Dishley breeder is one whose validity cannot be totally denied. After stressing the even greater importance of practical breeders less famous at the time and in the following years, it is said of Bakewell that:

Nothing, however -- no denigration of some of the qualities of his new breeds, no animadversions of his shrewd materialism, no ironic comment upon his vain and esoteric showmanship -- nothing can take away from Robert Bakewell the credit for inspiring in a multitude of fellow stockmen the spirit of improvement.<sup>36</sup>

Trow-Smith's creation is not perfect. He, too, suffers from a less than critical use of farming manuals in that he assumes the texts he consults to reflect the practice of their day. Still, Trow-Smith does recognize continuities in the textual tradition and is careful to make temporal distinctions, rather than lumping texts from different centuries together as 'proof' of a particular practice. In addition, Trow-Smith uses the texts only as sources for details, such as treatment for a particular illness, rather than repeating judgmental remarks made, or opinions expressed, by the manual authors. Of all the works surveyed above, his is the one which changes least from a new interpretation of farming manuals, those commonly cited and little analyzed historical documents.

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<sup>35</sup>Ibid., p. 45.

<sup>36</sup>Ibid., p. 69.

## Chapter 2

### THE TEXTUAL TRADITION:

#### A Review of the Primary Literature

Farming manuals can provide astonishingly interesting reading. It is difficult to imagine that a didactic literature dealing with topics as esoteric as pig-breeding and the proper conditioning of arable soil could possibly be of interest to historians of anything other than agricultural technology and practice. Yet the relative wealth of textual survivals within the genre of 'agricultural manual' for medieval and early modern England makes them a valuable historical source. It is surprising that historians have routinely ignored or under-estimated the value of such authors as Walter of Henley, Fitzherbert and Mortimer. This neglect might be intelligible if the manuals had been ignored by political, institutional or intellectual historians. Food production, so vital to the survival and success of human society, has consistently been subject to the same biases which have caused the practitioners of agriculture to remain near the bottom of the social hierarchy. However, even historians of agricultural practices have consistently failed to extract the maximum potential from the available texts. Surveys have been conducted; lists and annotated bibliographies have been compiled. Yet no analysis has been undertaken to determine the nature and social context of the manuals. A careful reading of a representative sample of

manuals, combined with an overview of general trends in the genre, reveals that the texts are by no means uncomplicated exemplars.

Obviously, the manuals which make the most explicit references to the linked subject of generation and nutrition are of the greatest value to a study of pre-eighteenth century English pastoral husbandry. It is not enough, though, merely to select didactic texts with some degree of specific reference to breeding and feeding. Some manuals were more popular than others and had a greater contemporary influence. Obviously, these are worth more detailed study. A number of texts of foreign origin were translated and imported into England. Such translations were usually less popular than the texts of English authors and, in many cases, the foreign works were incorporated into or republished as the work of an English author. In addition to using texts by English authors which contain specific references to generation and nutrition, some attempt must be made to achieve an even temporal spread. While there are inevitable gaps in the archival record and natural ebbs in the flow of printed manuals over time, it is possible to insure that a survey of the texts does not contain any gaping holes. In fact, especially in the early modern era, nearly every twenty-five year period contains something of interest.

Many of the current misapprehensions regarding the practice of animal breeding in early modern England derive from a failure to look at all manifestations of agriculturally-oriented literature as a unified genre. To fail to take the extant medieval didactic treatises into account is an invitation to be misled by the the exhortations, proclaiming their originality, made by the early modern manualists. Though

usually ignored, the medieval manuals share many features in common with their early modern counterparts. Four medieval texts are of particular interest. These have been collected in a single volume and edited by Dorothea Oschinsky.<sup>37</sup>

All four texts share certain features. All, to judge by the wealth of textual survivals and references to these writings in other manuals, were of some contemporary influence. They are practical in nature, being designed to enable wealthy estate owners to oversee the management of their lands effectively. The various positions held by all participants in the agricultural enterprise are listed and their responsibilities are detailed. Some specifics are given. Basic expectations regarding yields from both pastoral and arable sectors are included. The articulation of these expectations can reveal something of the contemporaneous breeding and feeding strategies.

The first of the extant medieval texts to have had a significant audience appears to have been the Rules attributed to Robert Grosseteste, Bishop of Lincoln, and is dated to c. 1240-42.<sup>38</sup> Though renowned as man of science, Grosseteste limited himself to very practical advice, with a concentration on accounting, over-seeing and protocol. The newly widowed Countess of Lincoln, for whom Grosseteste's text was originally written, received little information from the manual regarding the breeding and feeding of the animals on her estate. The

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<sup>37</sup>Dorothea Oschinsky. Walter of Henley and Other Treatises on Estate Management and Accounting (Oxford: Clarendon Press, 1971).

<sup>38</sup>Robert Grosseteste. The Rules of Robert Grosseteste In: Dorothea Oschinsky. Walter of Henley and Other Treatises on Estate Management and Accounting, p. 196.

only specifics regarding livestock management are the estimated wool yields (in marks) for equal numbers of sheep on good, medium and poor pasture. Little though this is, it is evidence of the recognized correlation between nutrition and wool growth in sheep.

The Seneschaucy (c. 1276-85)<sup>39</sup> contains more information of particular interest to a study of generation and nutrition. The author says that both steward and bailiff should be possessed of a good working knowledge of the duties inherent in their positions and should insure that 'improvements' are constantly made.<sup>40</sup> The bailiff was expected to oversee the culling of unfit animals and so, by implication, the maintenance of the breeding herd. Indeed, his task of insuring the well-being of the large livestock was apparently ranked as equal in importance to his tasks of a legal nature and the selling of produce.<sup>41</sup> Interestingly, the text suggests that the sheep on the estate should be examined thrice annually 'by men who are experienced in this work'.<sup>42</sup> This intimation of a possible group of 'sheep specialists' is tantalizing but, unfortunately, unsubstantiated, there being no further reference to that group of men in the Seneschaucy or the other texts surveyed. The descriptions of positions which deal with animals reveal

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<sup>39</sup>Ibid., p. 75.

<sup>40</sup>Anonymous. The Seneschaucy In: Dorothea Oschinsky. Walter of Henley and Other Treatises on Estate Management and Accounting, p. 265-9. The word improvement is used several times in this section and reiterated throughout the text, being explicitly tied to the concept of 'progress' (Oschinsky's translation of *lamendement*), for example, in section 18, p. 268-9.

<sup>41</sup>Ibid., p. 271.

<sup>42</sup>Ibid., p. 275 & 287.

an understanding of the importance of good quality fodder to overall livestock performance, as was found in the Rules. No specifics are given for the selection of breeding stock, apart from the reminder that old, sick animals and 'those that will not grow' should be fattened and sold for meat.<sup>43</sup> The Husbandry of Walter of Henley (c. 1276-85)<sup>44</sup> is based very heavily on the Seneschaucy. It contains a bit more detailed information than the previous manual and recommends the use of experiment in farming practice.<sup>45</sup> The advice in the Husbandry appears more authoritative in that it gives specific figures for feeding ratios and for the number of offspring which could be expected from various types of livestock. Closer inspection reveals the figures for the production of young may be somewhat optimistic.<sup>46</sup>

There exists a second, anonymous Husbandry (c. 1286-1316)<sup>47</sup>, containing some very clearly articulated advice on the subjects of breeding and feeding. A strict account of the various ages of all

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<sup>43</sup>Ibid., pp. 281-289. The phrase 'those that will not grow' is particularly interesting. It articulates a positive breeding strategy (one using prime animals as breed-stock) and implies an ability to pre-judge the growth potential of an animal based on criterion other than empirical measurement.

<sup>44</sup>Oschinsky. Walter of Henley and Other Treatises on Estate Mangement and Accounting, p. 189.

<sup>45</sup>Walter of Henley. The Husbandry of Walter of Henley In: Oschinsky. Walter of Henley and Other Treatises on Estate Management and Accounting, p. 317, 325.

<sup>46</sup>For example, expecting two litters a year from a sow (Ibid., 335) is possible, but unlikely. Sows gestate for 116 days, making two litters a year feasible, but scarce winter feed and relatively long periods before weaning make it unlikely that this ideal was regularly achieved.

<sup>47</sup>Oschinsky. Walter of Henley and Other Treatises on Estate Mangement and Accounting, p. 200.



breeding stock was to be kept.<sup>48</sup> Again, somewhat idealized yield figures are given. For example, sows should farrow twice a year and produce at least seven piglets each time. Each hen should produce 'one hundred and fifteen eggs and seven chickens' annually.<sup>49</sup> To ensure that these expectations were properly fulfilled, the reeve was to keep strict records and answer for any short-comings. In the case of the manor's mares:

...if there is any mare which has no foal [that year] an inquiry ought to be made whether this is due to bad keeping or lack of food, too much work or through lack of a stallion, or whether the mare is barren and that the reeve could have changed her -- and in time -- for another but did not do so. In these cases he ought to be charged fully for the foal or the value.<sup>50</sup>

Though strict attention is to be paid to the number of young produced, the author of the Husbandry recognizes that not all animals produce at the same level. This is particularly noticable in the recommendations made regarding the milk yield of the manorial cows. He states that age, feeding, and individual idiosyncrasies are all factors.<sup>51</sup> The later mention of very specific figures, for example, 'seven stone of butter and one stone of cheese' per cow on 'good pasture', seems to indicate that specific production expectations are meant primarily as guidelines.

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<sup>48</sup>Anonymous. The Husbandry In: Dorothea Oschinsky. Walter of Henley and Other Treatises on Estate Management and Accounting, p. 423. This is particularly important as records of this sort, later codified as Stud Books or Registeries, are often seen by historians as indicative of incipient selective breeding programs in later centuries.

<sup>49</sup>Ibid., 425.

<sup>50</sup>Ibid., 423. This procedure is also to be carried out against the production of ewes and calves, p. 427.

<sup>51</sup>Ibid., 429 & 431.

If a general characterization can be made of the medieval agricultural manuals, it is that they are eminently practical in nature, yet not designed to deal specifically with the intricacies of everyday procedure. As Oschinsky has demonstrated, they were designed for accountants, not stockmen or ploughmen. This does not mean that they are of no use to the agricultural historian. There are snippets of information which indicate an understanding of principles of breeding and feeding which many historians have thought nonexistent until the early modern era.

From the medieval manuals of the thirteenth century, there is a substantial gap in the archival record. The next agricultural literature of general interest appeared after the introduction of the printing press in England. The early modern manuals do not have the same clearly defined purpose as their medieval counterparts. There is undoubtedly a continuum of function with the medieval manuals: both were designed to allow landowners to supervise the management of their estates more effectively, though this is much more clearly articulated in the medieval treatises. There may also be something more. Previous historians have used these didactic treatises as an aid in determining the course of agricultural practice over time. Therefore, if previous histories are to be trusted, a glance at the trends in theories of generation and nutrition over time should elucidate something of the state of animal breeding during the 'agricultural revolution'. This is not the case. In fact, though much interesting material can be gleaned from the agricultural texts of the early modern era, the actual information regarding pastoral husbandry remains surprisingly static. Especially in

the eighteenth century, manual authors found it necessary to characterize earlier texts as non-progressive and unenlightening in order to provide incentive to purchase their new book. However, from Fitzherbert to Young, little change in content can be perceived.

The transition from the rather prosaic medieval manuals to the more complex manuals of the early modern era is well illustrated in Sir Anthony Fitzherbert's Boke of Hvsbandry.<sup>52</sup> Dating from 1523, Fitzherbert's book combines a medieval practicality with certain traits particular to the early modern textual tradition. On the surface, it appears to be a useful set of agricultural directives. The Boke of Hvsbandry is exemplary in organization, moving from the basics of farm management in a logical sequence toward less immediately critical topics. Yet closer inspection reveals a lack of details and specifics. However, there is a recognition of the differing nutritive value of different grasses and hays.<sup>53</sup> The most explicit, and most interesting, discussion of this subject is to be found in connection with the rearing of sheep. The times at which the ram may be put to the ewe were determined by the type of pasture on which the ewe would feed at lambing time. For example, sheep on enclosed pasture with good, early spring feed could be bred at any time, while sheep on the common heath, where feed was late rising

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<sup>52</sup>The authorship of this text is open to some question. Sir Anthony's brother John has often been put forward as the possible author, as he is considered more likely to have had the necessary practical experience. Sir Anthony was a judge and author of several other legal and surveying texts. For a discussion of this matter see Rev. Walter W. Skeat's Introduction to the English Dialect Society version of the Boke of Hvsbandry: Anthony Fitzherbert. The Boke of Hvsbandry. In: English Dialect Society <13> (London: Trubner & Co., 1882 <1534>).

<sup>53</sup>Ibid., p. 32 & 34.

and very sparse, should only be allowed limited access to the ram at the late date of October 28, a month and a half later than ewes on good common pasture.<sup>54</sup> This passage indicates a clear relation of the availability of feed to milk production and to the necessity of good feed for ewes in the period prior to lambing. It is also significant in its clear reference to the segregation of stud rams from all ewes on common pastures. Common flocks could, at first glance, be considered a hindrance to selective breeding due to the lack of control over blood-stock. Fitzherbert would seem to indicate that this problem need not be considered as a major factor. Certainly, most of the early modern manuals which deal with stock-breeding reveal an overwhelming concern with gelding and spaying of stock not deemed to be of breeding quality. Even using latter-day historians' favourite source, it appears that livestock breeding was under more control than they had previously assumed.

It is in his discussion of horse-breeding that Fitzherbert reveals the greatest amount of information concerning contemporary theories of generation and nutrition. His advice is practical, his outlook pragmatic. He suggests that mares and studs be kept separate for 'dyuers causes, and specyally he shall be the more lusty, and the moo horse-coltes shall he get.'<sup>55</sup> While Fitzherbert subscribes somewhat to the theory that a breeding pair's emotions can affect the gender of

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<sup>54</sup>Ibid., 42.

<sup>55</sup>Ibid., 60. Please note that, unless otherwise specified, all quotations from the early modern manuals remain faithful to the original spelling, punctuation, capitalization and use of italics. Only the letter 'f' has been transliterated to 's'.

their offspring, he has no use for those who say that the moon's cycle determines a foal's sex, saying: 'And me semethe, that those men that hold that opinyon speak sophystycallye'. In a later chapter, entitled, 'For a Yonge Gentyll-man, that Entendeth to Thryue', he writes 'It is better the practiue or knowlege of an husband-man well proued, than the science or connyng of a philospher not proued.'<sup>56</sup> He also advises the young gentleman to keep extensive records relating to the management of the land, with special notes on practices which were particular successes or failures.

However practical Fitzherbert's Boke appears to be, it contains a few unexpected elements. In most cases, the information he gives is too general to be a useful practical guide. The more specific information is often supplied in Latin or French. Of the 172 chapters, the last 31 deal with subjects more ecclesiastical than rural. Fitzherbert's book is ostensibly a manual for all aspects of the farmer's life, yet it does not seem to speak to the agricultural practitioner in a way which would help to increase production. As with the medieval manuals, Fitzherbert's Boke appears to have been intended more for the supervisor of agricultural endeavours, rather than the practitioners.

The Boke of Hvsbandry is, in many ways, a perfect transitional work. Fitzherbert incorporated much of the utilitarianism of the medieval tradition and also demonstrated new trends. He mixed practical advice with comments which, though instructive in some ways, have little to do with farming technique.<sup>57</sup> He used example to reinforce his state-

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<sup>56</sup>Ibid., 91.

<sup>57</sup>In this, Fitzherbert resembles the medieval manuals, especially that of Robert Grosseteste.

ments.<sup>58</sup> He concentrated to a large degree on the horse, a species perceived as possessing a nobility of character lacking in other species of livestock.

Anthony Fitzherbert was the first of the early modern agricultural writers but his example was soon followed by an ever increasing number of authors. Titles remained sparse during the early sixteenth and seventeenth centuries, yet there were agricultural writers producing and their work was being bought and read. It is possible to see Fitzherbert as the first in a progression of authors stretching to, and beyond, the eighteenth century. However, the body of works prior to 1800 exhibit some unifying characteristics.

Most importantly, breeding and feeding are not a large factor in the textual tradition as a whole. The arable portion of the agricultural economy received far more attention than its pastoral counterpart. One of the most famous of the sixteenth century texts, Thomas Tusser's Fiue Hundred Pointes of Good Hysbandry contains very little information about breeding or feeding. The text's format made it easy to read, being set up essentially as a calendar for the year's events. The information provided is sketchy and very basic indeed. The most instructive comment on the subject of generation and nutrition is the statement 'keepe twinnes for breed/ as ewes haue need'<sup>59</sup> Here at

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<sup>58</sup>Though this trait is also to be found in the medieval texts, it is very much a preoccupation of the early modern authors, especially those of the eighteenth century.

<sup>59</sup>Thomas Tusser. The Fiue Hundred Pointes of Good Husbandrie W. Payne and Sidney J. Herrtage <eds>, English Dialect Society <8>, (London: Trubner & Co., 1878 <1573, collated with 1577>), p. 74, repeated 81-2.

least there is an intimation of the recognition of twinning as a heritable characteristic.

The remaining manuals are somewhat more prolific, indeed, often prolix, in their articulation of theories of generation and nutrition. In some cases, astrology is suggested as a major factor in guiding breeding decisions. There are inter-textual references to subjects clearly not related to the better practice of animal-keeping. In general, talk of nutrition is far more prevalent than discussion of the mysteries of generation. While some speculation is made concerning possible influences on generation, the advice about matters of breeding is at a different level from that propounded for feeding systems. Veterinary medicine, in the form of endless recitations of diseases and their herbal cures, is a major preoccupation of the agricultural authors. While many of the diseases, and even some of the cures, have changed little over the intervening centuries, the cures reveal attempts to deal with animal medicine much in the same fashion as humans were treated.<sup>60</sup>

Much of the extant corpus of works dealing with animal generation and nutrition can be covered simply by surveying the works of Ger-vase Markham. Markham, who lived from 1568 to 1637,<sup>61</sup> was a fabulously prolific writer. The extant corpus of his works is large and confusing

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<sup>60</sup>A recent reprint of Queen Henrietta Maria's medical handbook (originally published in 1655) bears a striking resemblance to the veterinary sections of contemporaneous farming texts. See: Simon Bond. Secrets of the Queen's Closet (originally: The Queen's Closet Opened). Tom Isitt, ed. (Southampton: Ashford Press, 1988).

<sup>61</sup>M=Donald. Agricultural Writers from Sir Walter of Henley to Arthur Young, p. 84.

due to his habit of publishing other people's material under his own name and republishing his previous books under new titles. Markham was an expert on horses and should, therefore, be in a position to give the clearest descriptions of their breeding and feeding. Hopes for enlightenment are raised by the author's statement that:

of ... contemplative Recreations, I prefer none before that Gentlemanly and beneficial delight of breeding creatures meet for the use of men, and the good of the common-wealth wherein he liveth.<sup>62</sup>

Markham's advice was certainly designed for the gentleman of leisure, but it is in no way clear how, for example, his disquisition on 'How to Ride Before a Prince'<sup>63</sup> would enhance the 'common-wealth'. Some interesting, and relatively concrete, points can be determined from Markham's work. His texts show the benefit of Markham's years of experience with horses in their clear and detailed description of stable management techniques.<sup>64</sup> Feeding is, of course, included in stable management and this was very important to Markham. He reiterated the value of good quality feed over and over. The reason for this insistence is to be found in the Masterpiece<sup>65</sup>, which restricts itself exclusively to the subject of horses. The first chapter, 'On the Natu-

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<sup>62</sup>Gervase Markham. Cheape and Good Husbandry <5th ed.> (London: 'printed by Nicholas Okes for John Harrison & to be sold at his shop in Paternoster Row.', 1631), p. 41.

<sup>63</sup>The instructions on riding before royalty are somewhat bizarrely placed in the Cheap and Good Husbandry (pp. 14-35).

<sup>64</sup>As an expert on horses, Gervase Markham was chosen to select and import an Arab stallion for King James I. This incident is described in: M<sup>rs</sup> Donald. Agricultural Writers From Sir Walter of Henley to Arthur Young, p. 86.

<sup>65</sup>Gervase Markham. Masterpiece <20th ed.> (London: 'printed for G. Conyers at the Ring in Little-Britain, W. Wooten at the Three Daggers in Fleet-street and J. Clark at the Golden Ball in Duck-lane', 1723).



ral Composition of Horses Bodies', lists 13 components - the same as human composition in Markham's opinion. The seven 'natural' aspects are: 'elements, temperments, humours, members, powers or virtues, actions or operations and spirits'. Markham also lists 6 unnatural components, namely: 'air, meat and drink, motion and rest, sleep and watch, emptiness and fullness and the affects or motions of the mind'.<sup>66</sup> Any disturbance of the balances effected by the component parts could result in illness or death. For example, the 'Pestilent Consumption in Mares' is caused when:

...cold Flegm gathered by raw foggy Food in the winter Season, which depending from the Kidneys, doth oppress the Matrix, and makes the mare consume and pine away.<sup>67</sup>

More generally, food which is not clean and wholesome 'breeds naughty, evil blood'<sup>68</sup> 'Too ranke feeding' is also bad, being linked to 'heart disease'.<sup>69</sup> It is evident, then, that ingestion can be seen as affecting the natural composition of the horse's body.

Markham's works are excellent on the subject of equine nutrition, providing not only admonitions and suggestions, but also explanations, such as the ones given above, for the efficacy of his advice. Their discussions of physiology and reproduction are also authoritative in tone. There are diagrams to illustrate the venous, skeletal and muscular structures of the equine body.<sup>70</sup> A discussion of barrenness in

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<sup>66</sup>Ibid., p. 1.

<sup>67</sup>Ibid., p. 100

<sup>68</sup>Ibid., p. 2.

<sup>69</sup>Markham. Cheape and Good Husbandry, p. 66.

<sup>70</sup>Markham. Masterpiece, pp. 128, 131 & 133.

mares cites both malfunctions of the humours and physical malformations of the uterine horn as possible causes.<sup>71</sup> Such combinations of tangible and intangible forces also arise in Markham's discussions of generation.

On the more concrete side, there is a very mathematical description of the ideal conformation of breeding stock, listing ideal ratios for body proportions.<sup>72</sup> Much attention is paid to the physical conditioning of breeding pairs, with nutrition again a major factor. Types of ground likely to provide good feed are listed and there is a specific recognition of the correlation between good feed and plentiful milk in mares.<sup>73</sup> Perhaps most importantly, Markham stressed the individual needs of each animal.<sup>74</sup> In this, he differed from the more simplistic medieval directives which were designed only to give broad guidelines.

The more utilitarian aspects of Markham's texts contain in their midst facets which appear less applicable to the modern agriculturalist. The use of astrology as a guide to farmyard procedure is one of the practices recommended by Markham and, indeed, other early modern authors, which is least acceptable to modern, institutional science. For instance, Markham postulated that foals bred before the full moon would be female, while those conceived under a waning moon

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<sup>71</sup>Ibid., p. 100.

<sup>72</sup>Ibid., p. 125.

<sup>73</sup>Markham. Cheape and Good Husbandry, pp. 42 & 45.

<sup>74</sup>Ibid., p. 57.

would be male.<sup>75</sup> Another example of a reliance on less tangible principles crops up in a section on pregnant mares:

to know if your mare is with foal at *Christmas*, or no, put a little water in her Ear, and if she only shake her head, than she is with Foal, but if she shake both Head and Body, too, she is not.<sup>76</sup>

If, to the modern reader, this seems unlikely to garner worthwhile results, it is at least relatively harmless for the mare. Markham suggested adding insult to injury for any bovine bitten by a shrew, the proffered cure being to 'beat him with a bramble'.<sup>77</sup> It would be wrong to criticize the inclusion of these particular pieces of advice. No matter how they compare to current modes of explanation, they served a definite purpose, acting as part of a system through which the natural world could be understood and controlled.

In general, only the more concrete advice is repeated for livestock perceived as less noble in nature than the horse. For example, milk production in cows is linked to the quality of pasture.<sup>78</sup> Markham noted that both wool production and fertility increase when sheep are on good pasture.<sup>79</sup> In the early modern era in general, the

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<sup>75</sup>Markham. Masterpiece, p. 120.

<sup>76</sup>Ibid., p. 121.

<sup>77</sup>Markham, Cheape and Good Husbandry, p. 105.

<sup>78</sup>Ibid., pp. 105-6.

<sup>79</sup>Ibid., p. 107. The advice concerning sheep is repeated (p. 120 ff) in a chapter entitled 'A Few Precepts for the Shepherd'. This is the only chapter of the manual in the Cheape and Good Husbandry which is directed to the actual practitioners of the described activities. Inclusions of passages addressed to the shepherds and other specific agricultural 'offices' are not found only in the Cheape and Good Husbandry. Rather, such inclusions can be counted as a general characteristic of early modern agricultural manuals.

amount of interest in, and print space given to, a particular species decreases with the esteem in which the species was held. The goat is the most neglected type of 'cattle'<sup>80</sup>, deemed unattractive both physically and economically. Swine fare little better. Markham was rather unusually prolix on the subject of these two species, yet in essence only repeated information given previously for more esteemed beasts.

From an examination of Markham's texts, it is an easy step to Conrad Heresbach's The Whole Art of Hvsbandry. Markham himself provides the link, having made additions to an edition of the German Heresbach's work translated by Barnaby Googe.<sup>81</sup> Though Heresbach's book may actually pre-date the majority of Markham's work, Heresbach was definitely secondary in importance.<sup>82</sup> The third book of the Whole Art of Hvsbandry deals specifically with 'Feeding, Breeding and Curing of Cattle'. The elevated discursive style and the classical references of the text cover a great deal of practical information and also some sur-

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<sup>80</sup>The agricultural texts refer to all domesticated, cloven-hooved mammals as 'cattle' or 'cattel'. The bovine species are usually designated 'ox', 'milch cow' or 'beeve'.

<sup>81</sup>Conrad Heresbach. The Whole Art of Hvsbandry Contained in Fovre Bookes. Barnaby Googe <trans.>, Gervase Markham <ed.> (London: 'printed by T.C. for Richard More & to be sold at his shop in S. Dunstanes Churchyard in Fleete-street.', 1631). Markham's additions are chiefly concerned with the fancy points of horse breeding and judging. For example, he adds much on the significance of colouring in horses, something Heresbach dismisses as silly. See esp. p. 215 ff.

<sup>82</sup>Though secondary to Markham, Heresbach's manual was exceptionally popular and was retained as of admittedly foreign provenance, rather than being immediately subsumed by English plagiarisms. For this reason, and because of the substantial additions by an English author, Heresbach's is included as an exception to the general exclusion of foreign texts.

prising inclusions. The chapter on cameleopards<sup>83</sup> is a particularly interesting example of the latter. The former, the more practical side of the text, is exemplified in Heresbach's description of horse-breeding:

He that hath fancy to breed horses, must first provide himself of a good Race, and then of good ground, and Plentie of pasture, which in other cattel ought not to be so greatly observed, but in horses there must be special care thereof.<sup>84</sup>

Just as in the earlier manuals, there is a preoccupation with culling off sub-standard breeding stock.<sup>85</sup> Detailed descriptions of ideal conformation types are given and a question-and-answer format segment, with Pliny and Aristotle often quoted, describes the proper times and ages at which to breed.<sup>86</sup> The classics, especially Xenophon, are once again in evidence when the subject of training young horses is dealt with. Heresbach's interest in the authors of antiquity is a point upon which he parts company with Markham. Whereas Markham ridiculed 'Ancient Experiments' and preferred 'later Experience',<sup>87</sup> Heresbach openly appreciated Greek and Latin texts.<sup>88</sup> Even the myth of the hip-

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<sup>83</sup>Ibid., p. 267.

<sup>84</sup>Ibid., p. 213.

<sup>85</sup>Ibid., See esp. p. 219.

<sup>86</sup>Ibid., p. 215 ff.

<sup>87</sup>Markham, Masterpiece, p. 98.

<sup>88</sup>Such classical texts, especially the poetry of Vergil and Horace, were apparently combined with some observations of current practice and extensive plagiarisms of previous authors to provide the content of most early modern manuals.

pomanes is perpetuated.<sup>89</sup> Basically, though, Heresbach gives a useful overview of livestock breeding and feeding strategies. He made an unusual link between the description of breeding practices for menage horses, the standard subjects of early modern agricultural authors, and their less glamorous counterparts, the plough and cart horses, stating baldly that breeding techniques were the same, no matter what tasks the horses will perform.<sup>90</sup>

In all, Heresbach's text is an odd mixture of very practical advice and bizarre inclusions. He gave detailed descriptions of ideal phenotypes for all types of livestock and made the usual connection between feeding practice and issues such as fecundity, fleece quality and milk production. However practical The Whole Art of Hvsbandry can be, there are also the cameleopards, the child-eating sows and the horses violently averse to incest, all of which are, to say the least, somewhat apocryphal.<sup>91</sup> However, perhaps the most bizarre aspect of all is the rabid insistence that young mammals not drink the colostrum in first milk as it is poisonous.<sup>92</sup>

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<sup>89</sup>The hippomanes was thought to be 'a small, black, fleshy substance' attached to the forehead of a newly-born foal. It was believed that the mare had to bite off this protruberence immediately if the foal was to survive. The hippomanes was believed to be a potent aphrodisiac. See: The Shorter Oxford English Dictionary on Historical Principles (3rd ed.) (Oxford: Clarendon Press, 1967).

<sup>90</sup>Ibid., p. 213.

<sup>91</sup>Ibid. See pp. 237, 281 and 218-9, respectively. The non-oedipal horse is particularly interesting, as Bakewell's successful in-and-in programs were necessarily incestuous.

<sup>92</sup>Ibid. An excellent example is to be found in the discussion of lambs, when the substance is actually referred to as 'colostra', as opposed to simply first milk as it is elsewhere designated (p. 265). As colostrum provides much of a newborn mammal's acquired immunity, this could be a very dangerous practice.

Judged by its title, Leonard Mascall's The Government of Cattle appears to be the perfect source for an examination of livestock breeding and feeding.<sup>93</sup> However, the text is chiefly comprised of repetitions of earlier authors. Some interesting exceptions do exist. Along with references to a number of classical Roman texts and extolling the benefits of astrology, Mascall gave some prosaic descriptions of the relative value of various feedstuffs. For example, hay and barley are mentioned specifically and their relative virtues and difficulties are outlined.<sup>94</sup> Instructions on feeding of breeding stock during the seasons of the year are given, with a particular concern for females about to give birth.<sup>95</sup> Different ways to fatten animals are given. At least five methods are described just for 'fattening' pigs.<sup>96</sup> Mascall gave many straightforward directives, yet, on the whole, his text remains somehow unconnected from the nuts and bolts of livestock husbandry. An abundance of detail on some subjects and sweeping generalizations in other areas make the text less useful than it at first appears. Once again a reader unfamiliar with agriculture would be hard pressed to develop a complete and workable method of animal breeding from the pages of Mascall's book.

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<sup>93</sup>Leonard Mascall. The Government of Cattle (London: 'printed for Tho. Purfoot for Francis Falkner and to be sold at his shop neere St. Margaret's Hill in Southwarke', 1627).

<sup>94</sup>Ibid., p. 61 & 72. See also p. 233 for the affect of different grasses on sheep.

<sup>95</sup>Ibid. See esp. pp. 69-70, 102, 227 & 269.

<sup>96</sup>Ibid., pp. 264-81. An amazing amount of detail is given, down to trapping mice so that they do not disturb the pigs and make them move about the sty.

The reason for this dichotomy, obvious also in the earlier manuals, is in some degree illustrated by Mascall's own use of terms in the description of his audience. The early modern authors, as a rule, exhort their readers to use the manuals as reference works. Yet it is not clear how they would augment the basic knowledge needed by anyone already practicing agriculture. Mascall made it clear that his text was addressed to the 'learned Gentleman', not the 'unlearned Husbandman'.<sup>97</sup> In fact, a special verse at the beginning is dedicated 'To the Husbandman'. Just as Markham included a special segment, 'A Few Precepts for the Shepheard',<sup>98</sup> as though he did not expect the shepherd to read the rest of the manual, Mascall made it clear that the bulk of his text was not meant for the eyes of the men who actually carried out the work described. A special introduction 'To the Husbandman' was written in verse with very simplified language, while the remainder of the manual was elevated in style and vocabulary and done in prose, with constant references to classical authors and philosophers.

Two more works complete the list of pre-eighteenth century agricultural manuals of particular interest for the study of pastoral husbandry. The Systema Agriculturae of John Worlidge<sup>99</sup> is even more explicit in its definition of its target audience than was Mascall's text. It is dedicated 'To the Gentry and Yeomanry of England'. In the epistle dedicatore, Worlidge announced his intention of using 'experi-

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<sup>97</sup>Ibid., A4 (Introduction).

<sup>98</sup>Markham. Cheape and Good Husbandry, p. 120

<sup>99</sup>John Worlidge. Systema Agriculturae (London: 'printed by T. Johnson for Samuel Speed near the Inner Temple Gate in Fleet-street', 1669).



ment' and 'observation' to devise methods for agricultural endeavours. He alluded to the large number of farming texts available contemporaneously, but suggested that his audience would be receiving land from bankrupt tenants and should be prepared to manage it well. Worlidge gave one chapter of the Systemae to the subject of animal-keeping. There was nothing of great insight in his disquisition. He was more interested in glorifying the pursuit of agriculture than in the actual practice of it.

Sir Jonas Moore was somewhat less blatant in England's Interest or the Gentleman and Farmer's Friend.<sup>100</sup> While, again, there was little new in his text, it did reveal a reason for concern with the breeding of horses. In a manual largely concerned with arable agriculture, horse-breeding was singled out for discussion because after 'the last war', English merchants could sell horses to France for three times their value and:

At the conclusion of this present War we may with Presumption say that there will be a great consumption of *Horses* in Foreign Parts, and that they will be become as Good a Commodity as at the time before mentioned; and therefore I leave it to the Consideration of our *Gentry* who have lands proper for the Breeding of Cattle, and of the *Farmer's* who Rent, such Lands are better Breeding Good and Servicable Horses.<sup>101</sup>

Moore was very concerned with the proper feeding of foals, seeing it as crucial to their optimal growth.<sup>102</sup> He was also determined

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<sup>100</sup>Sir Jonas Moore. England's Interest or the Gentleman and Farmer's Friend (London: 'printed for A. Bettesworth at the Red Lion in Pater-noster-Row', 1721).

<sup>101</sup>Ibid., p. 59.

<sup>102</sup>Ibid., p. 56.

to undermine the image of the superior Spanish horse.<sup>103</sup> Clearly Moore saw Spanish horses as the greatest rivals to English equines.

Moore's text is the last of the agricultural manuals which deals with pastoral husbandry before the advent of the eighteenth century. The basic advice of all the authors who came before him can be seen as summarized neatly in Moore's own text. In his chapter 'Instructions for Breeding Horses much Cheaper', he states that:

The same Care is to be taken in this point of Choice, as the Gardeners take to have good stock, and com to produce a Noble and Generous Fruit [and] In Choice also of your Breeders, be sure They are Healthy and of Sound Constitution.<sup>104</sup>

Essentially this is the sum of the advice on the subject of generation given prior to 1700 in the many, many pages of agricultural literature which had been written. Nutritional theory was similarly prosaic, though quite effective. There is far more to be gleaned from the texts regarding their social context, audience and purpose than there is available information about actual livestock breeding and feeding.

The eighteenth century being characterized by historians, for example Eric Kerridge and Mingay and Chambers, as a period of revolution in pastoral husbandry, and agricultural literature being cited by these historians as a source for this alteration, the manuals of the eighteenth century should reflect enormous changes in the articulation and manipulation of theories of generation and nutrition. The first of the major eighteenth century manuals proves a great disappointment in this

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<sup>103</sup>Ibid., pp. 58-9.

<sup>104</sup>Ibid., p. 49-50.

respect. Mortimer's The Whole Art of Husbandry is a favourite source for modern historians. Yet there is nothing in Mortimer's text that is particularly new or interesting. The text itself is very well organized and contains an excellent index.<sup>105</sup> However, if it lives up to the author's promise of 'Additions of new Experiments and Improvements not treated of by any others',<sup>106</sup> it must be in dealing with subjects other than pastoral husbandry. Mortimer only repeated the advice of earlier authors in his exhortations. 'If you design to have beautiful strong Colts, let your stallion and mare be so':<sup>107</sup> this is hardly revolutionary, especially as there is no definition of what beauty is in a horse, or how beauty would relate to different tasks.

If there is something particularly interesting about Mortimer, it is his interest in the regional varieties of livestock. He listed a number of counties noted for producing good livestock.<sup>108</sup> Three other points stand out in The Whole Art of Husbandry. Firstly, Mortimer was himself a Fellow of the Royal Society and particularly interested in attracting the attention of institutional science to the practice of

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<sup>105</sup>Indices were not a new innovation, but they were nearly useless in some of the earlier works.

<sup>106</sup>John Mortimer. The Whole Art of Husbandry (London: 'J.H. for H. Mortlack at the Phoenix, J. Robinson at the Golden Lion in St. Paul's Church-Yard', 1708).

<sup>107</sup>Ibid., p. 150.

<sup>108</sup>Earlier manuals tend to list sheep varieties and to give broad definitions of regional types of cattle, but it is still somewhat unusual to find horses thus regionally defined. Markham in particular was interested in the characteristics of horses from other countries, but not regions within England.

agriculture.<sup>109</sup> Secondly, he mentioned the practice of letting stud stock out to hire, one of the cornerstones of Bakewell's success and a behaviour often attributed to him as founder.<sup>110</sup> Thirdly, Mortimer recognized that his manual was being read by an elevated stratum of society. For example, in his discussion of the care of pregnant mares, he described an ideal situation and then added 'Which are Niceties the Farmer seldom troubles himself about.'<sup>111</sup> Mortimer's lack of respect for the hands-on practitioners of agriculture points to one of the greatest problems with relying on early modern farming manuals as a source for past practices. His statements are representative of attitudes repeatedly expressed in early modern agricultural texts. There are many reasons to think that the manuals were, in fact, quite disconnected from practice.<sup>112</sup>

Roughly contemporary with Mortimer's text is the Dictionarium Rusticum, Urbanicum & Botanicum. Because 'Husbandry has been much in vogue in England of late times',<sup>113</sup> the anonymous author read the best works he could find on the subject and, in his own opinion, compiled their wisdom into a single text.<sup>114</sup> Interestingly, many terms,

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<sup>109</sup>Ibid., Introduction.

<sup>110</sup>Ibid., p. 151.

<sup>111</sup>Ibid., p. 152.

<sup>112</sup>Please see below, Chapter 3, esp. pp. 61-9 & 76-7.

<sup>113</sup>Anonymous. Dictionarium Rusticum, Urbanicum & Botanicum (London: 'J. Nicholson in Little Britain, W. Taylor in Avemary Lane, and W. Churchill in Paternoster Row', 1717), in the 'Preface to the Reader'.

<sup>114</sup>He cites among his sources: Fitzherbert, Tusser, Markham, Mascall, Mortimer and excerpts from the Philosophical Transactions of the Royal Society.

agricultural, physiological and general are discussed only as they apply to horses. Belly, breeding, fattening, froth, head, parts and strain: all are defined by their implications for equines and nothing else. The Dictionarium is very much a distillation, adding little to the store of knowledge, though providing some very interesting data for the historian in its apparent lack of concern with animals of a lesser degree than horses and in its statement of the popularity of agriculture among the more monied members of society.

The Country Gentleman's Vade Mecum in many ways resembles the Dictionarium. The author, G. Jacob, Gent., also read the texts of his predecessors and, after comparing 'theory with practice' he collected the 'opinions of experienced Country Gentlemen and [the] observations of the most eminent Husbandmen and Gardiners'. He also claims to have 'experimental knowledge suffused throughout the whole'.<sup>115</sup> The concern with allying agriculture with institutional science is further demonstrated in this text. Not surprisingly, there are no intimations of revolutionary changes in the practice of animal breeding. In fact there are no changes at all.

The Gentleman & Farmers Guide for the Increase and Improvement of Cattle was Richard Bradley's entry into the group of authors of agricultural manuals. Both a Fellow of the Royal Society and Professor

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<sup>115</sup>Giles Jacob. The Country Gentleman's Vade Mecum (London: 'printed for Wm. Taylor at the Ship in Pater-noster-row', 1717). See the 'Preface to the Reader'.

of Botany at the University of Cambridge,<sup>116</sup> Bradley had a clearly stated purpose for the publication of his manual:

I beg leave to present you with the following Piece, relating to the Improvment of our Nation by Cattle, which makes one of the largest branches of the British Wealth; or, as I may say, is one of the brightest Jewels in the British *Diadem*; no Part of the World being so famous for Their Prudence & Dexterity in the Management of the Woollen Manufacture as the Nations under the *British* Government. Nor is any Country capable of producing more Beautiful & Useful Horses than are bred with us.

Our Universal Trade proceeding from the Wool of our Sheep, makes us Master of the Products of the Whole Earth; and does no less make us superior to all other People in the strength arising from our navigation.<sup>117</sup>

Later in the manual, Bradley mentions a few common misconceptions about the linkage of horn type to lambing ability, saying that, even though they are wrong, such misconceptions should be included for the benefit of those 'unacquainted with this sort of Husbandry' and who 'may in time have Opportunities of practicing it, and may then know how to talk with the Learned.'<sup>118</sup> While his precepts for the breeding and feeding of cattle are, again, reiterations of much earlier texts, Bradley exhibits a wide-ranging interest in several aspects of generation which hint at that much-desired connection between agriculture and institutional science. He considers the implications for natural

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<sup>116</sup>The apparent link between institutional science and agriculture in the person of Richard Bradley is only a mirage. Bradley caused a scandal when he first gained the Chair at Cambridge through false pretences and was later found to be illiterate in the classical languages and not terribly interested in lecturing either. See: Fussell. The Old English Farming Books From Fitzherbert to Tull, p. 106-7.

<sup>117</sup>Richard Bradley. The Gentleman & Farmer's Guide for the Increase and Improvment of Cattle (London: 'printed by J. Applebee, for W. Mears, at the Lamb without Temple Bar', 1729). From the Preface, ii-iii, in which the text is dedicated to the Rt. Hon. Lord Vane.

<sup>118</sup>Ibid., p. 12-3.

philosophy arising from speculations concerning the possible offspring from various matings of whole and cloven-hoof pigs.<sup>119</sup> The colouring patterns of piebald horses aroused his interest and led him also to speculate on the results of children born to black and white human couples.

The flavour of experimental science is to be found even more strongly in William Ellis' highly regarded text. Honoured by both his contemporaries and by modern historians, Ellis used case studies to lend authority to his work.<sup>120</sup> On breeding and feeding, his manual is detailed, yet repetative. Once again, no significant change in the theory of raising animals to maturity is to be found. However, excellent directions are given on methods of selling fattened sheep.<sup>121</sup>

Having reached the middle of the eighteenth century and the period so often lauded as characterized by great change in pastoral husbandry, it seems that great changes in the process of animal breeding must soon appear in the textual record, where previous historians have claimed to find them. Unfortunately, A New System of Agriculture fails to deliver anything new in the way of suggestions to improve livestock husbandry. The 'Country Gentleman' who whiled away his hours writing

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<sup>119</sup>Ibid., p. 69.

<sup>120</sup>William Ellis. A Compleat System of Experienced Improvements (Dublin: George Faulkner in Essex Street, 1749). This manual was sold with the approval and recommendation of The Dublin Society, one of the first (founded 1731) of the regional societies to exhibit an interest in agricultural improvement. That interest is continued to this day. See esp.: James Meenan and Desmond Clark (ed.s). The Royal Dublin Society, 1731-1981 (Dublin: Gill and MacMillan, 1981). Though not strictly English in origin, Ellis' text was highly regarded and very popular in England itself.

<sup>121</sup>Ibid., p. 371 ff.

this text spent far more time extolling the virtues of farming as a source of wealth. While husbandry may well be the 'only Gentleman-like way of growing rich',<sup>122</sup> it would be difficult to do so on the basis of this particular manual. It repeats earlier material, though less competently than most. For example, anyone wanting to start up or improve a dairy would find themselves in possession of a wonderful byre, but with no notion of which sort of cattle to buy or how to feed them.

Thomas Hale shows some promise of actually tackling the fundamentals of animal husbandry.<sup>123</sup> He warns his readers to ignore the writings of his predecessors as there is nothing to be gained from them. He then proceeds to regurgitate Markham and Walter of Henley, almost word for word in many cases. Just as in the earliest manuals, it is assumed that the selection of breeding stock will be done by somebody who knows what he is looking for. This knowledge is not expected to come from books.

Arthur Young maintains the same attitude as Hale: experiment and practical experience are the order of the day and books are not to be trusted. This did not stop Young from producing reams of printed text with the full expectation that his writings would be read and his advice followed by a great number of people. In the secondary literature, Young appears as a figure as revolutionary as Bakewell. And, indeed, this is in many ways an accurate description. Young's pub-

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<sup>122</sup>Ibid., p. 1.

<sup>123</sup>Thomas Hale. A Compleat Body of Husbandry (London: 'printed for T. Osborne & J. Shipton in Gray's Inn; J. Hodge on London Bridge; T. Trye nar Gray's Inn Gate; And S. Crowder & H. Woodgate in Pater-Noster Row', 1756).



lications were a departure from previous trends. In addition to publishing manuals in the familiar pattern, he set out to catalogue the agricultural features and practices of England and even travelled to Ireland and France to examine farming practices in those countries.<sup>124</sup> However, as unique as his reports were, the pastoral content of his didactic texts shows little change from the medieval agricultural manuals. Admittedly, once again interest in the arable sector overwhelms discussion of stock-keeping. In A Course of Experimental Agriculture,<sup>125</sup> Young devoted only one chapter to livestock. The stated rules for their breeding and feeding are little different from anything that had preceded his book. Though admirably detailed tables are used to illustrate experiments in animal feeding, the trials being undertaken are chiefly concerned with manure production, rather than with physical improvement in 'cattle', or in enhancing the genetic potential of livestock to produce more wool, meat, milk or work. Young failed so much as to attempt a description of desirable qualities in breeding stock, saying 'In ... these matters practice is the only master; books are not worth a groat.'<sup>126</sup> Whatever Arthur Young's value for the history of arable farming, his works provide little support for current models of pastoral development.

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<sup>124</sup>Arthur Young's records of his journeys are fascinating documents, but are not so relevant for an investigation of English breeding and feeding as his more traditional manuals.

<sup>125</sup>Arthur Young. A Course of Experimental Agriculture: Containing an exact Register of all the Business Transacted during Five Years on near 300 Acres of Various Soils (London: 'J. Dodsley, in Pall Mall', 1770).

<sup>126</sup>Ibid., p. 447.

In short, the work of Arthur Young does not describe a revolution in animal breeding practices. Though his texts are more geographically systematic and comprehensive than those of his predecessors, the descriptions of the process of livestock breeding throughout his works remains remarkably similar to medieval writings.<sup>127</sup> Young made no claim for a revolution in breeding practices, yet his laudatory reports of Robert Bakewell and the advances in animal husbandry being made at Dishley Grange are cited by Ernle and many twentieth century historians as evidence of radical change. Attempts to fit animal breeding into both the 'revolutionary' and evolutionary models of English agricultural change have forced an interpretation of Young's reports as constituting an eye-witness account of great changes in agricultural production in general. This is particularly true of Mingay and Chambers. If their temporal designation (1750-1880) of the 'agricultural revolution' is correct, then Young, writing in the second half of the eighteenth century, must have witnessed and chronicled significant changes, especially those in the pastoral sector. However, reading Young for specific changes in animal husbandry reveals problems with such an interpretation. Experimentation and systematic record-keeping are expressed as new concepts in Young's work, yet neither suggestion was innovative. Moreover, the expected changes in breeding practices do not

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<sup>127</sup>Young's advice, for all its trappings of empirical experimentation, could be summed up as something approximating 'cull off the old, sick ones and make sure they all have enough to eat'. This is essentially identical to the dicta expressed in the *Capitulare de Villis*, the late eighth century Carolingian document which describes the procedures to be carried out on the royal estates of the emperor Charlemagne. A translation of this document is available in: Patrick J. Geary (ed.). *Readings in Medieval History* (Toronto: Broadview Press, 1989), pp. 325-33. See esp.: items 13, 14 and 23.

appear. In fact, this sort of disappointment is not unique to a reading of Arthur Young's work. Even Richard Parkinson, who actually visited Dishley, spoke with Bakewell and recorded what he had learned, did not demonstrate anything new or interesting in his manual.<sup>128</sup>

From all the extant texts which deal most effectively with generation and nutrition, there develops a curious sense of dissatisfaction with the genre. Something seems to be missing. There is little or no specific statement of practical theories of generation or nutrition presented in a manner which could be manipulated to produce a desired change. Given the accepted view that the eighteenth century was a period of rapid, indeed, revolutionary change, the manuals should reflect this with an alteration in the information which they catalogue. If the current interpretations of eighteenth-century pastoral husbandry are correct, then works from the latter half of the century should be different from their immediate predecessors. Moreover, there should be a radical change from the information propounded in farming treatises from the Middle Ages and the early modern era.

As can be clearly seen from a survey of the texts dealing most extensively with animal husbandry from the Middle Ages to the end of the eighteenth century, the expected changes simply do not appear. Throughout the period of study, animal breeding and feeding is described in very similar ways. Some general characteristics can be outlined. Horses provide the favoured vehicle for discussions of livestock hus-

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<sup>128</sup>Richard Parkinson. The Experienced Farmer, an Entire New Work, in Which the Whole System of Agriculture, Husbandry and the Breeding of Cattle, is Explained and Copiously Enlarged Upon... (London: 'printed for G. G. and J. Robinson, 1798). It should be mentioned that Bakewell himself unfortunately never wrote a manual.

bandry. General descriptions of desired phenotype are given, though little distinction is made for differing purposes. Less glamorous animals receive little attention, though sheep are discussed at some length by a number of authors. There is a distinct recognition of the necessity of good quality feed. Experience is cited as the key to success. In short, a claim can be made for a distinct continuity within the genre. The late seventeenth and eighteenth century preoccupation with gaining the attention of institutional science, specifically in the form of the Royal Society,<sup>129</sup> stands out as a new element. As this preoccupation is the only apparent vehicle for change, the connection between science and agriculture must be examined at greater length.

The medieval manuals have often been considered distinct from their early modern counterparts. Oschinsky has clearly demonstrated their use as aides for accounting on large estates. Thus, the information which they provide about techniques of agricultural management is, of necessity, sketchy. However, it is by no means clear that the didactic agricultural treatises of the early modern period are radically different from the medieval manuals either in practical advice or authorial motivation. It is the motivation -- the impulse for publication -- which is perhaps the most important of the unaddressed problems in interpreting farming manuals. Fitzherbert includes some of the anomalous characteristics of the early modern texts which make them appear indicative more of a program of justification for, and glorification of, agriculture as a source of wealth, than of physical improve-

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<sup>129</sup>The Royal Society, founded in 1660, was referred to specifically by the authors who sought to attract the attention of 'science' or 'Natural Philosophy'. Please see below Chapter 3, esp. pp. 58-9 & 69-76.

ments in farming technique. Particularly in the years between Fitzherbert's publications and the end of the seventeenth century, agricultural writings exhibited a growing popularity.<sup>130</sup> No doubt several factors were at work. Originally, the novelty of print may well have spurred an interest in publishing agricultural manuals, which later became a self-perpetuating genre. However, their content cannot be completely reconciled with the stated purpose. Speaking from the end of the eighteenth century, Arthur Young may be able to assist in an interpretation of the somewhat bizarre literary tradition to which he was heir:

People who are eager in Their husbandry read such books; and as these ridiculous practices come recommended to them by those who ought to know better, They are tempted to try them. They do so - and of course fail to their no inconsiderable loss; hence a disgust is taken at the very idea of experiments or *book-husbandry*; The door is shut against beneficial trials; and a whole neighbourhood of farmers clap their hands with pleasure at the gentleman's disappointment, determining never to be misled by books into any *new tricks*, which only tend to impoverish Them.<sup>131</sup>

The much despised and disappointed gentlemen referred to in Young's passage may well have been figures much like the sightseers at Dishley Grange. That supposedly key figure in English pastoral agriculture, Robert Bakewell, found that his activities were of interest to a

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<sup>130</sup>McDonald and Fussell give figures for the astonishing number of printings which many of the manuals went into. These must remain as estimates only, but it was not uncommon for manuals to go into 20 or 30 printings even in the sixteenth century. The ever increasing number of authors, and the successful reprintings of old material speak eloquently for the saleability of manuals. In addition, extant manuals listed as held in the Goldsmith's-Kress collection increase almost exponentially between the sixteenth and eighteenth centuries.

<sup>131</sup>Arthur Young. The Farmer's Letters to the People of England & Sylvae, or occasional Tracts on Husbandry and Rural Economics (3rd ed) (2 vol.s) (London: 'Printed for W. Strahan; W. Nicol, No. 51, in St. Patrick's Church-Yard; T. Cadell, in the Strand; B. Collins, Salisbury; and J. Balfour, Edinburgh', 1771).

vast array of wealthy and socially elevated persons. According to Ernle: 'In his kitchen he entertained Russian Princes, French and German Royal Dukes, British peers and sightseers of every degree.'<sup>132</sup> This serves to reinforce the theory that farming manuals were the product of fancy, not farming. An examination of the species of animals described (primarily the expensive and 'noble' horse) reveals much about the interests of both authors and audiences. A preoccupation with attracting the attention of institutional science, increasing over the period of study, is also indicative of social influences not previously recognized. If farming manuals fail to uphold current models of agricultural change, it is possible that an examination of the social context of agricultural manuals may help to clarify matters.

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<sup>132</sup>Ernle. English Farming Past and Present, p. 185.

## Chapter 3

## AGRICULTURE AS SCIENCE AND TECHNOLOGY:

## The Practical and Social Ramifications

The preoccupation with science, beginning with the formation of the Royal Society, must be considered a primary factor in the analysis of agricultural manuals. The desire, on the part of the manualists, to appear 'scientific' is a change in the textual tradition resulting from social influences which guided the development of the agricultural manual as a genre. Science, as applied to agriculture, has been seen by many historians as a progressive force. Thus, the interest in science at the time of supposedly revolutionary changes in the practice of animal husbandry should not be surprising. However, if the manuals are not what they have been assumed to be by previous historians, is the application of science so important? In fact, it is crucial. Its importance stems not from radical improvements made in agricultural production by the application of scientific principles, but rather as an explanatory tool for the interpretation of farming manuals.

Previously, a reading of early modern agricultural manuals has led historians to an interpretation of agriculture in this period as non-'scientific'. Indeed, Mingay and Chambers state that 'modern

scientific agriculture and High Farming' were products which followed the 'agricultural revolution', developing to maturity in the nineteenth century.<sup>133</sup> Several factors have doubtless contributed to this characterization by previous historians. Primarily, it is the influence of the evolutionary models, supported by 'evidence' from farming manuals, which has hampered interpretations of pre-modern pastoral history. The stereotypical 'backwardness' so often associated with the Middle Ages has also been applied to the history of livestock breeding in its 'pre-scientific' incarnation.<sup>134</sup> Essentially, historians from Ernle to Mingay and Chambers agree that Robert Bakewell provided the revolutionary changes which propelled animal husbandry into the modern era by applying proto-'scientific' principles to livestock breeding. Some scientists, such as Russell and Marshall and Hammond differ slightly in their opinion, seeing Bakewell as the herald of the future and modern genetic theory as the true revolution.

Perhaps some of the difficulties inherent in the classification of agriculture as 'scientific' or not devolve from the variety of definitions given to 'science' by both the early modern manualists and twentieth century historians. Generally, historians have assumed that the term 'science' implies academic enquiries carried out by institutions, or individuals working within a nebulously defined 'scientific

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<sup>133</sup>Mingay and Chambers. The Agricultural Revolution, p. 2.

<sup>134</sup>Though definitions of 'pre-scientific' change from author to author, anytime before 1750 can safely be considered a static period in the opinions expressed in current literature. As with so much else in pastoral history, the designation 'pre-scientific' is drawn from a discussion of arable agriculture, which was dramatically effected by, among other things, the introduction of artificial phosphate fertilizers in the mid-1830s.



community', who use experiment and observation to extract knowledge about natural phenomena. This definition has been imposed upon agricultural manuals which make reference to experimental method and 'Natural Philosophy'. Unfortunately, the manualists were clearly more interested in the Royal Society as an institution than with the application of scientific knowledge to the process of agricultural improvement. Some manual authors were more interested in science for its own sake and some were not interested in either 'science' or the Royal Society. However, as a rule, those manuals which appear after the mid-seventeenth century and articulate a desire to attract the attention of those who practice science, can be assumed to refer to the Royal Society in particular, rather than to institutional science as a whole. In general, those authors who expressed a desire to attract the attention of the Royal Society referred to agriculture as fit for the application of 'Natural Philosophy'. They did not refer to themselves as 'philosophers', only to agriculture as the subject of experimental method and Natural Philosophy. This distinction is a necessary one and must be made if the prevailing models of pastoral development are to be revised by a new interpretation of farming manuals and the developmental trends ostensibly outlined on their pages. However, this is not the only revision that must be made.

In order to re-evaluate the course of pastoral husbandry between the thirteenth and nineteenth centuries, it is necessary to strip away evolutionary models of economic development. Next, any intimations of procedural changes or changes in causal explanation (which may reveal the influence of science) as propounded in the manuals

must be specifically noted, unlike the practice of most previous historians. As shown above, such an analysis reveals little change in theories of animal breeding over the course of six centuries. However, the manuals also reveal no change during or after Robert Bakewell's illustrious career. Obviously, this is a problem for traditional historiography. In fact, this fracture in the veneer is absolutely crucial. Probing the crack establishes the hollowness of the traditional model and leads to a deeper questioning of the texts themselves.

The final step in a re-evaluation of pastoral husbandry is the vital one. Rather than accepting the manuals at face value, it is necessary to look at the all-important social context of the genre. The content of the manuals cannot be properly judged until the questions of readership and influence have been in some way addressed. It is here that the relationship between science and agriculture becomes particularly important. If science is to be used as the touch-stone for modernity, then it becomes important to understand why science and agriculture might or might not have been open to some interchange. Investigating the implications of this question for pastoral husbandry, in the context of didactic agricultural literature, can illuminate certain peculiarities of the genre which have skewed modern interpretations of past agricultural procedures.

At first glance, the model which views agriculture and science as separate fields of endeavour has much to recommend it for the period of study. Technology and institutional science remained largely aloof from one another through most of the Middle Ages. To a large extent, the social distinction between the inhabitants of the schools and

universities and the men who were physically attempting to deal with the perceived problems of medieval life denied any opportunity for a symbiotic relationship. The class barrier which separated technologists and scientists stemmed in part from a continuation of Greek, and, therefore, Roman, ideas about the relative social value of work, manual labour being confined to those lowest in the hierarchy. Even the obvious benefits to be gained from the labours of technologists did not raise their social status as:

...paradoxically, the wide spread use and appreciation of the products of technology did not result in higher esteem for the ... man responsible for this progress.<sup>135</sup>

These barriers were slow to fall during the early modern era. Barriers are not, however, always entirely impermeable. The divisive factor which historically separated science and technology is perhaps better viewed as a porous membrane, with a certain amount of osmotic transfer taking place over time. The barrier itself is of great importance, but the transfers can also be illuminating.

Agriculture was traditionally held in low esteem during the Middle Ages. Yet in the 1200s a person of such exalted rank as Robert Grosseteste penned a treatise concerned with agriculture. The thirteenth-century changes in the intellectual community which allowed such a development have been examined by the historian of medieval thought, George Ovitt, Jr.<sup>136</sup> Ovitt reports an 'increased concern with

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<sup>135</sup>Melvin Kranzberg and William H. Davenport. 'At the Start'. In: Technology and Culture Melvin Kranzberg and William H. Davenport, <ed's> (New York: Schocken Books, 1972), p. 12.

<sup>136</sup>George Ovitt, Jr. The Restoration of Perfection: Labor and Technology in Medieval Culture (New Brunswick & London: Rutgers University Press, 1987).

the mechanical arts [in which agriculture was included] in classifications of learning' in the twelfth and thirteenth centuries.<sup>137</sup> In addition, the mechanical arts 'underwent a reconsideration and a redefinition in the thirteenth century, one that altered their order and description but did not enhance their status'.<sup>138</sup> Thus, agriculture was attracting new interest but science, as embodied in institutions of learning, was still very much separate from the practice of agriculture.

As a renowned man of science and the author of an early farming manual, Robert Grosseteste should be an excellent subject with whom to begin an investigation of the interaction between science and agriculture. However, in terms of scientific interest, Grosseteste's manual proves itself an example of both Ovitt's thesis and the continuing disparity between science and agriculture.<sup>139</sup> Though some argument may be made for the influence on Grosseteste's Rules of his specific female, aristocratic audience or even for a genuine lack of interest in things rural on Grosseteste's part, his text proves to be an example of the mutual exclusivity of institutional science and agriculture in the Middle Ages. And, indeed, that same exclusivity can be said to hold basically true of the pastoral content of farming manuals through the whole period of study, both medieval and early modern. This fits with the traditional view of the 'pre-scientific' nature of animal husbandry prior to the nineteenth century, if it is assumed that the manuals

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<sup>137</sup>Ibid., p. 126.

<sup>138</sup>Ibid.

<sup>139</sup>See above pp. 24-5. It should be emphasized that Grosseteste's manual, though eventually reaching a wider audience, was originally directed specifically to the Countess of Lincoln.

reflect practice. To do so would be to commit a grave error. Several factors served as inhibitors to the interaction of science and agriculture. An examination of those barriers can also help to illuminate the problems inherent in an assumption that manuals and agricultural practice were inextricably linked.

A possible cause of the inability of scientists and agriculturalists to communicate has been tangentially addressed by G. E. Fussell. In a discussion of 'Crop nutrition in Tudor and Stuart England', he cites the example of Francis Bacon's theory of a single 'vegetable salt' -- a sort of super-fertilizer.<sup>140</sup> Fussell indicates that the 'vegetable salt' theory was developed without the assistance of anyone with agricultural knowledge and that, in fact, anyone with such knowledge would have been appalled by the very thought. This rash assumption on Fussell's part is not totally unfounded. Fussell continues with a suggestion that the lack of a common vocabulary, a necessary conduit for the exchange of ideas, hampered the possibility of just such a mutually beneficial exchange. Fussell later stated that:

...it is my belief that the findings of the early scientists were unlikely to reach the farming districts or the farmers working there. On this point I am a confirmed agnostic after some fifty years of reading on the subject.<sup>141</sup>

But if vocabulary and social boundaries served as barriers between the authors of the manuals and their scientific contemporaries, the same may have held true of the lack of communication between the

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<sup>140</sup>G. E. Fussell. 'Crop Nutrition in Tudor and Stuart England' Agricultural History Review 3 (1955)., p. 104

<sup>141</sup>G. E. Fussell. 'Agricultural Science and Experiment in the Eighteenth Century: an Attempt at a Definition' Agricultural History Review 24 (1976), p. 47.

manualists and agricultural practitioners. This point has been consistently overlooked and is crucial to a clearer understanding of the roles which the manuals filled both at the time of their original publication and in the formation of modern historiography. There are many intimations in the manuals that their projected audience was rather wealthy in material possessions. This is evident even in the earliest manuals. Fitzherbert casually mentions sending one's 'bayley' to run errands<sup>142</sup> and Tusser mentions a variety of rooms in what is obviously the extensive and well furnished home he assumes his reader to reside in.<sup>143</sup> Similar comments abound in the plethora of manuals which followed. One trend of particular note is the insistence upon the importance of the horse in the manual tradition. The horse was considered a particularly noble animal and worthy of attention where pigs and cows were not.

Many of the manuals contain statements to the effect that they do not expect farmers to read them or they provide special introductions or chapters addressed to the farmer (as opposed to the Gentleman) in a different, simplified language, or in verse.<sup>144</sup> Especially in the earlier texts there are suggestions that the owner of the text will read it aloud to his workers. Speaking from the early sixteenth century, Fitzherbert makes an explicit statement to this effect. In the chapter

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<sup>142</sup>Fitzherbert. The Boke of Hvsbandry, p. 85.

<sup>143</sup>Tusser. The Fiue Hundred Pointes of Good Husbandry, pp. 190-2.

<sup>144</sup>Please see above, p. 42.

entitled 'How to Thryue', Fitzherbert strongly recommends that the 'gentyllman, accordynge to the season of the yere, rede to his seruantes what chapyter he wyll.'<sup>145</sup> Arthur Young's scathing late-eighteenth century comment on the subject of manuals and their audiences and influence has, of course, already been recounted.<sup>146</sup> Young's passage seems to indicate clearly the disinclination of practicing agriculturalists to rely upon printed matter.

Between Fitzherbert and Young came Sir Richard Weston, who unwittingly addressed the same issue in the seventeenth century when he wrote to his sons that:

When your Neighbours see your Labors thrive and prosper ... when they once see your Crops and somewhat understand that you do reap som benefit by them, they will com to you as to an oracle to ask your council.<sup>147</sup>

What Sir Richard stated as a simple fact has been further examined by a modern sociologist. In a study which mapped adoption rates of new techniques over time, the deciding factor determining the alacrity with which the majority of innovators adopted new techniques was found to be closely tied to the availability of positive information concerning the techniques in question.<sup>148</sup> The most influential source of such information was verbal contact with peers, especially neighbours whose experiments could be watched and judged either worthy or lacking. Printed materials were of less influence than physical example. While

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<sup>145</sup>Fitzherbert. The Boke of Hysbandry, p. 91.

<sup>146</sup>Please see above, p. 55.

<sup>147</sup>Weston. Discourse, p. 24.

<sup>148</sup>Herbert H. Lionberger. Adoption of New Ideas and Practices (Ames, Iowa: The Iowa State University Press, 1960), see esp. pp. 37-40.

common sense would dictate that the manual authors and their gentlemanly audience would tend to be more innovative than their poorer neighbours and employees, another modern study casts some doubt upon this assumption. A second study has shown that there is an inherent ultra-conservatism in the upper-middle class which may cause them to be less innovative than those of lower and higher socio-economic status.<sup>149</sup> The social position of the manual authors can be seen as corresponding roughly to that of a modern upper-middle class. Therefore, it is possible that those producing agricultural literature were not, in fact, most likely to put innovation into practice and that the literature itself was probably not influential in agricultural innovation.

Two recent articles have produced findings which illustrate these points further. The first, dealing with 'Agricultural Improvement and the Neglected Labourer' has emphasized the role of 'horizontal linkages' in the innovatory process.<sup>150</sup> By focussing on the users of a new innovation, and their personal adaptations of the novel process or product, rather than on the vertical linkages involved in moving from invention to first commercial use, the importance of the agricultural labourer and the sources of information available to him are revealed as influential in agricultural innovation.<sup>151</sup> In particular, the author,

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<sup>149</sup>Frank Cancian. The Innovator's Situation: Upper-Middle Class Conservatism in Farming Communities (Stanford, California: Stanford University Press, 1979). See esp., p. 3.

<sup>150</sup>Stuart McDonald. 'Agricultural Improvement and the Neglected Labourer' Agricultural History Review 31 (1983), p. 83.

<sup>151</sup>McDonald draws his discussion of horizontal linkages from: D. Leonard Barton & E. Rogers 'Horizontal Diffusion of Innovations: An Alternative Paradigm to the Classical Diffusion Model', Working Paper 1214, Alfred P. Sloan School of Management, MIT, 1981.



Stuart McDonald, a specialist in the history of technology, wishes to overcome the characterization of the 'agricultural simpleton' and to demonstrate that farm labourers were, at least in the late eighteenth century, used as conduits for the dissemination of new innovations. Trusted labourers were sent by wealthy landowners to areas where a desired process was in use. Once trained in the new skills by their peers, these men returned home to pass on the new technology through physical example and personal experience. Others did not travel, but were used to judge the value of an innovation before its wholesale adoption.<sup>152</sup> Many examples are given. Of particular interest is the description of Sir John Deleval's late eighteenth century experiments on his northern estates. He drew his original ideas from farming manuals, but relied upon his steward to report upon the success of the new procedures as judged by those who used them. Matthew, the ploughman, was particularly difficult to please. A glance at the structure of two new ploughs ordered from London presented to him for trial convinced him that 'nether of them will answer weel for this strong Land'. This example speaks eloquently for the unlikelihood of farming literature reaching and influencing agricultural practitioners such as Matthew.

The intimation that printed matter was considered neither trustworthy nor interesting by agricultural practitioners is also to be found in Nicholas Goddard's article on early agricultural periodicals.<sup>153</sup> Again focussing on the late eighteenth century, Goddard, a

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<sup>152</sup>Ibid., pp. 85-90.

<sup>153</sup>Nicholas Goddard. 'The Development and Influence of Agricultural Periodicals and Newspapers, 1780-1880' Agricultural History Review 31 (1983), pp. 116-131.

specialist in nineteenth-century agriculturalists and 'High Farming', states positively that farmers were reluctant to consult printed matter. While agricultural texts languished in the early nineteenth century, usually characterized by historians as a period of great innovation in farming practices, periodicals dealing with "'country sport' or cater[ing to] 'those interested in the colour of a canary, the swiftness of a pigeon, or the length of a rabbits ears' built up profitable circulations."<sup>154</sup> Thus it seems that even in the nineteenth century the most popular agricultural literature dealt with the aspects of farming manuals which were very popular in earlier centuries, namely sport and fancy characteristics.<sup>155</sup> Goddard's figures for subscriptions indicate that regional agricultural societies were among the more regular takers of periodical literature. Most societies kept reading rooms and encouraged their members to read the books and periodicals available there.<sup>156</sup> At present, there is no evidence to suggest that the regional societies, for all their good intentions, ever had a significant impact on changes in agricultural production. Therefore, it seems unlikely that agricultural literature was able to increase its influence on practice under the aegis of the regional agricultural societies. Yet again, Goddard reinforces the intimation that farming literature was not the motor for agricultural change in the past.

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<sup>154</sup>Ibid., p. 124. Goddard is quoting from : J. C. Morton. 'Agricultural Education' Journal of the Royal Agricultural Society of England I <2nd series> (1865), pp. 455-7.

<sup>155</sup>For example, the huge number of manuals which deal almost exclusively with the horse, whether for the menage, hunting or racing are indicative of this attitude.

<sup>156</sup>Ibid., p. 123.

The problem of communication between farmers and manuals is perhaps most clearly exhibited in Mortimer's 'Foreword' to The Whole Art of Husbandry:

I have endeavoured, throughout the whole Book, to Express my self in a few words and as plain a Stile as I could, for the Benefit of Vulgar Readers, the Culture of the Lands being left almost entirely to their Management.<sup>157</sup>

Mortimer was at pains to distance himself from the men who guided the plows and fed the pigs. Yet there is a further nuance to his agenda that should not be overlooked. Mortimer illustrated the separation of agricultural manualists from institutional science, addressing his 'Foreword' to the Royal Society<sup>158</sup> and using it to plead for a greater affinity, saying:

tho' *Agriculture* is what some may have a slight Opinion of, yet 'tis one of those Arts, to the Teachers whereof Dr. *Sprat* (now Bishop of *Rochester*) says, the Ancients pay'd the Diviner Sort of Honour.<sup>159</sup>

Mortimer extended his glorification of agriculture only to its 'Teachers' and not to its practitioners. This is a vital distinction. Previous authors sought to enhance their position by pointing to the similarities between themselves and classical country gentlemen: those following would attempt to increase their relative position in society by demonstrating their ability to ally with the Royal Society.

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<sup>157</sup>Mortimer. The Whole Art of Husbandry, folio A3(b).

<sup>158</sup>The Royal Society and institutional science were essentially interchangeable from the point of view of the manualists and the preoccupation with attracting the attention of science can be dated from the inauguration of that august body.

<sup>159</sup>Ibid., folio A2(b). Dr. Sprat was the author of the History of the Royal Society.

Mortimer's attitude, voiced in 1708 is indicative of one of the most ubiquitous trends in eighteenth century agricultural manuals. A concrete link with the Royal Society was the goal of many authors in the late seventeenth and early eighteenth centuries.<sup>160</sup> At first glance, there is little that is surprising in such a desire. Yet the mid-seventeenth century had seen movements which have been seen as producing at least a channel of communication between science and agriculture.

Two modern studies, both focussing on the sociology of seventeenth century scientific endeavours, have found what are believed to be evidence of just such a connection.<sup>161</sup> In each case, it is Samuel Hartlib who serves as the link. Hartlib was certainly an influential figure. He acted as the hub for a huge amount of correspondance and activity designed to improve the world, physically and spiritually.<sup>162</sup> Hartlib and his associates maintained a philosophical outlook which has

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<sup>160</sup>John Worlidge set the tone for later authors in his 1669 call for the 'interest of that Royal & most excellent Society at Gresham College' (Systema Agriculturae, p. xiv). Though less blatant than Worlidge and Mortimer, Giles Jacob was also interested in proving the worthiness of agriculture as a subject for 'Natural Philosophy'. He states that 'Natural Philosophy ... [can] afford a pleasant Amusement, especially in the Country, & a Necessary & useful Knowledge' (The Country Gentleman's Vade Mecum, p. 37). These three gentlemen are representative of the variety of methods used to express similar agendas.

<sup>161</sup>Charles Webster. The Great Instauration: Science, Medicine & Reform, 1626-60 (London: Duckworth, 1975) and :Michael Hunter. Science and Society in Restoration England (Cambridge: Cambridge University Press, 1981).

<sup>162</sup>The extant corpus of Hartlib's papers is currently being converted to computer-readable data at the University of Leicester. The problems involved in recreating Hartlib's own complex network of interconnections which tied papers and correspondance on nearly every subject imaginable into one united whole is informatively described in: Michael Leslie. 'The Hartlib Papers Project: Text Retrieval with Large Datasets' Literary and Linguistic Computing 5(1990), pp. 58-69.

been characterized as millenarian.<sup>163</sup> In agricultural circles, Hartlib was most influential as a publisher and facilitator of other people's work. It was he who first discovered Sir Richard Weston's letter and had it printed as the Discourse. Hartlib also acted as instigator in the publishing of Walter Blith's manuals, The English Improver and The English Improver Improv'd.<sup>164</sup> Both of these texts are considered by modern historians to be exemplary for their clear articulation of innovations for the improvement of arable production. Looked at with fresh eyes, these two texts appear not as perfect farming manuals, but rather as examples of the millenarian ideals of their author and his correspondants.<sup>165</sup> Of Hartlib's own publications, his proposal for a new college of agriculture is most interesting. He proposed that:

*For if in all other Trades & Sciences, Colledges & Corporations have been and are exceedingly advantageous (if rightly ordered) for the Improvement of the talents of those that betake themselves thereunto; Why may we not conclude that in the Science & Trade of Husbandry, which is the mother of all other Trades & Scientificall Industries, a collegial way of teaching the Art thereof will be of infinite usefulness.*<sup>166</sup>

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<sup>163</sup>Hunter. Science and Society in Restoration England, p. 24 and Webster. The Great Instauration, pp. 1-31.

<sup>164</sup>Walter Blith. The English Improver... 'Clearly demonstrated from principles of sound reason, ingenuity and late but most certain reall experience.' (London: 'printed for J. Wright', 1649) and The English Improver Improv'd or the Survey of Husbandry Surveyed. (London: 'Printed for John Wright', 1652).

<sup>165</sup>The processes which are commonly seen as constituting the arable portion of the 'agricultural revolution' are all admirably described in Blith's works, though in no great detail. However, the author's stated purpose for publication was clearly more related to the millenarian message of the 'Hartlib Circle' than to advertising the adoption of new practices. Indeed, many of the 'innovations' described (such as fen drainage or convertible husbandry) had been in use for decades, even centuries.

<sup>166</sup>Samuel Hartlib. An Essay for the Advancement of Husbandry-Learning: or Propositions for the Erecting of a College of Husbandry (London: 'printed by Henry Hills', 1651), p. 3.

Though Hartlib wished to increase the productivity of the land for the good of the general public and 'not as now for mere self-profit', entrance to the college was to be quite limited: 'If any person of quality have a Son or kinsman 15 years old or upward' who could be substantially supported financially throughout his seven year period of attendance at the proposed college, then he could be instructed in the 'theorick & practick parts of this (of all others) most Auncient, Noble and honestly gainfull Art, Trade or Mystery'.<sup>167</sup> However, it is not for these factors alone that Hartlib is considered important by historians interested in science and, particularly, the sociology of early modern scientific movements.

The 'Hartlib circle', as it is referred to by Charles Webster, in his *magnum opus*, The Great Instauration, and by Michael Hunter in his study, were the founders of the 'Invisible College'. The college, which later developed into the Royal Society, was given its informal, but lasting, name by one of its members, and a great figure in the history of science, Robert Boyle.<sup>168</sup> Boyle's own predilection for the nutrition of plants, rather than animals, was both a continuation of the contemporary interest in arable agriculture and a precursor of things to come. The Invisible College, like the Royal Society itself, had little effect on, or apparent interest in, the subject of pastoral husbandry.

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<sup>167</sup>Ibid., p. 8-9. Men not 'of quality' could also enter the college, though only if they provided a fee of fifty pounds upon entry, as well as the maintenance fees. In any case, only a limited number of spaces were to be made available to applicants of lower degree.

<sup>168</sup>Sir E. John Russell. A History of Agricultural Science in Great Britain, p. 20.

Its importance for the history of animal husbandry lies in the new light which is shed upon the nature of farming manuals by the history of the nascent Royal Society.

The Royal Society was 'fashionable'.<sup>169</sup> Furthermore, 'scientific intellectuals were conspicuously successful in securing positions of advantage'.<sup>170</sup> The authors of agricultural manuals came almost exclusively from a stratum of society which could realistically expect to ally itself with the fashionable new Society designed to promote dialogue between technologists and scientists. However, in 1660, when the Invisible College was superseded by the Royal Society, Samuel Hartlib was not included in the list of founding members. No doubt many factors were involved in Hartlib's exclusion. However, it serves as an incident symbolic for its exclusion of Hartlib and several other authors primarily concerned with agriculture. Rural concerns remained an ostensible priority of the Royal Society, but the general interaction within the Society itself of science and technology was to take its toll upon agricultural investigations. Hunter suggests that the Royal Society itself promoted the increasing preoccupation with theoretical science. Improved communication, both within the English scientific community and with European theoretical scientists, was a significant element in this development, as scientific discoveries and theories were 'popularised ... almost overnight, ensuring swift and widespread acclaim for their inventors.'<sup>171</sup> It would appear that, just as agricultural

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<sup>169</sup>Webster. The Great Instauration, p. 492.

<sup>170</sup>Ibid., p. 486.

<sup>171</sup>Hunter. Science and Society in Restoration England, pp. 110-

manualists were presented with an institution which promised to produce some measure of fame and social advancement, the scientific community simultaneously moved off up the social ladder, leaving the manualists to make ever more desperate pleas for attention.

Ostensibly, Samuel Hartlib seems to have personified a group with a distinct interest in linking science and agriculture, yet such a union was still being actively sought a century later. Webster and Hunter, the historians of science, have fallen prey to the same suppositions which have misled agricultural and economic historians. By assuming that the few intimations of the influence of science on the arable sector found in the manuals are evidence for the success of Hartlib's intentions, Webster and Hunter have been deceived. The manuals in many ways were separated from both agriculture and science and could not serve to facilitate interactions.

A survey of the Philosophical Transactions of the Royal Society from its inception to 1800 shows that there was very little discernible interest in topics that dealt with animal agriculture. Only two articles stand out as of possible use or interest: one dealt with ill-tasting milk, the other with the Black Canker caterpillar.<sup>172</sup> In the same time period, there were descriptions of new animals being found in the America's and Australia. However, there was a distinct lack of

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<sup>172</sup>Stephen Hales 'An Account of Some Trials to Cure the Ill Taste of Milk, Which is Occasioned by the Food of Cows...' Philosophical Transactions of the Royal Society 49 (1755/6), pp. 339-347 and Wm. Marshall, Esq. 'An Account of the Black Canker Caterpillar Which Destroys the Turnips in Norfolk.' Phil. Trans. 73 (1783), pp. 217-222. Both of these men also wrote agricultural texts and both of these issues are dealt with extensively in the farming manuals of the period.



analysis in these articles and they appeared late in the period surveyed.<sup>173</sup>

In fact, there is more evidence for the separation of the manualists from scientific concerns than there is proof for the sort of connection the agricultural authors desired. The one early attempt on the part of the Royal Society to take up agricultural concerns serves as a case study. On March 30, 1664, a 'Georgical Committee' was set up to enquire into the state of arable agriculture in England.<sup>174</sup> The committee members, using as guides manuals written by 'Georgicall Authors', especially Hartlib,<sup>175</sup> designed a set of survey questions in two parts, arable (ie. crop land) and meadows, and appointed county representatives to collect data.<sup>176</sup> The questions dealt with issues such as methods of fertilization and types of crop for varying soil conditions. However, the lack of response was overwhelming. The intended survey faded into oblivion. Whatever the cause of the failure, whether Fussell's hypothesis of language barriers or some other factor, the lack of interest in the Committee may well have discouraged the Royal Society from

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<sup>173</sup>See esp. Thos. Pennant, Esq. 'An Account of the Turkey', Phil. Trans. 71 (1781), pp. 67-81 and Everard Home, Esq. 'Some Observations on the Mode of Generation of the Kangaroo' Phil. Trans. 85 (1795), pp. 221-239. These are the best, and very nearly the only, articles which show an interest in animals and/or animal breeding as a specific issue.

<sup>174</sup>R. V. Lennard. 'English Agriculture Under Charles II', Essays in Agrarian History <vol. 1.> W. E. Minchinton <ed.> (Newton Abbot: David & Charles, 1968)., pp. 161-186.

<sup>175</sup>Ibid., p. 164.

<sup>176</sup>The questions designed by the Georgical Committee again underline the concentration on the arable sector characteristic of the manuals and of current historiography.

further attempts to investigate questions of agricultural significance. The concept of the Georgical Committee's detailed enquiry into agricultural matters was eventually realized at the end of the eighteenth century, when the Board of Agriculture, with Arthur Young as Secretary, commissioned a similar set of questions and received a spectacular response. Obviously, new institutions like the regional societies and the Board of Agriculture were becoming more feasible as the nineteenth century approached. Certainly, agricultural literature as a genre seems to have undergone a change in the late 1700s. Arthur Young's new style of agricultural reporting was a herald of things to come. Short books covering every aspect of agricultural production gave way to far more detailed, regionally specific guides. 'Experiments' were detailed and extensive comparisons were made between farming regions. Young even began his own periodical, The Annals of Agriculture.<sup>177</sup> Young's contemporary, William Marshall, was to continue the trend for increasing detail and pragmatic cataloguing. His extensive works and his contribution to the Philosophical Transactions of the Royal Society<sup>178</sup> reveal a clear, precise and logical approach to agricultural practices.

If the manuals prior to Young and Marshall are viewed as a barrier against, rather than a conduit for, the interchange of ideas

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<sup>177</sup>The Annals were begun in 1784 and were both 'successful and long-lived'. (Fussell. More Old English Farming Books from Tull to the Board of Agriculture, p. 85.)

<sup>178</sup>Please see above, p. 74. A list of Marshall's most extensive works is to be found in the bibliography. Of particular value is his Abstract and Review of the County Reports to the Board of Agriculture (York: Thomas Wilson & Sons, 1818).

between science and agriculture, the continuing search for a link with institutional science on the part of the agricultural manualists, long after Samuel Hartlib, becomes comprehensible. Agricultural manualists wished to attract the attention of the Royal Society, yet the manuals were not themselves connected in any tangible way with agricultural practices and innovations. Even if the manualists had conceived an agenda designed to apply scientific principles to farming practices it is unlikely that such a plan could have been implemented through printed media. In turn, if the Royal Society had, as it appears to have done, desired to apply itself, through the 'Georgicall Authors', to improving agricultural practices, the manuals may actually have short-circuited the Society's seventeenth-century inquiries.

The Georgical Committee's intended enquiries, and their subsequent completion, nearly 150 years later, by the Board of Agriculture raises the question of the influence of the Board and regional societies as possible avenues for the approach of 'scientific' agriculture. There is some indication that these bodies acted as forums for an informal interchange of ideas. Ernle lists the growing number of regional societies throughout the late eighteenth century and gives examples of their diligence in seeking out new printed material.<sup>179</sup> As previously mentioned, these societies seem to have had little effect upon the

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<sup>179</sup>Ernle. English Farming Past and Present, pp. 208-9. In addition, the index to the Goldsmith's-Kress collection contains records of many surviving documents published under the names of county and regional agricultural societies. Most of these appear in the last fifteen years of the eighteenth century. Their interests were chiefly arable and their business primarily concerned with awarding prizes - much along the lines of the 'Biggest Pumpkin', 'Fattest Pig' or 'Biggest Sunflower' contests held in most rural exhibitions to this day.

actual practice of agriculture in general and even less on pastoral husbandry. Agricultural societies did not directly promote a connection with science. Neither did they serve as effective disseminators of agricultural knowledge.<sup>180</sup> However, their long-term importance should not be overlooked. They did provide a common place for men of similar interests to meet. Over time, the beneficial exchange of ideas did have an effect. The societies allowed some sense of unity to develop in a hitherto highly individualistic practice. Later, in the nineteenth century, theoretical and practical agriculture would become far more closely allied under the banners of improving societies.

The necessity of the application of science to bring about improvements in agriculture generally and, particularly, animal husbandry depends upon the definition of science being used. Science, as defined as 'a systematized knowledge of nature and the physical world',<sup>181</sup> can be applied to the work of agricultural practitioners as well as that of theoretical scientists. If the concept of the application of institutional science as a prerequisite for agricultural improvement is abandoned, the characterization of animal breeding as pre-scientific before Bakewell becomes obsolete. There was no eighteenth century 'revolution' in livestock husbandry and Bakewell was less a 'scientific' breeder than a consummate showman and promoter. There

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<sup>180</sup>Claudio Veliz. 'Arthur Young and the English Landed Interest, 1784-1813' (unpublished Ph.D. thesis, University of London, 1959, pp. 19-27 & 279-87) as cited in: Goddard, 'The Development and Influence of Agricultural Periodicals and Newspapers, 1780-1880'. Veliz concluded that 'the local societies had little direct influence on the ordinary farmer or farm practice' (p. 120).

<sup>181</sup>Webster's New Universal Unabridged Dictionary. (New York: Dorset & Baber, 1983).

is, then, nothing to stop the characterization of pre-Bakewellian selective breeding campaigns, such as those which produced medieval warhorses, as conscious efforts to control and improve animal types without the aid of science or, indeed, printed manuals. The warhorse is by no means the sole example of such campaigns, though it is the most fully documented. Though, often neglected, what is known of the breeding of the medieval warhorse from the ninth century on stands in direct opposition to most current histories of animal husbandry.<sup>182</sup> Animal breeding before Bakewell was not backward. Rather interpretations of pastoral history have been skewed by a reliance upon a literary tradition which has gone largely unanalyzed. Without some understanding of the social context of the manuals, it has been all too easy for modern historians to assume that the manual authors spoke the truth when like, for example, John Mortimer and Giles Jacobs,<sup>183</sup> they characterized their texts as new and innovative.

Practitioners of animal husbandry had available a system of knowledge, developed through experience, which could be used to produce desired changes in phenotype and performance through selective breeding

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<sup>182</sup>See esp.: R. H. C. Davis. The Medieval Warhorse: Origin, Development and Redevelopment (London: Thames and Hudson, 1989); R. H. C. Davis. 'The Medieval Warhorse' in: F. M. L. Thompson (Ed.). Horses in European Economic History (Leeds: The British Agricultural History Society, 1983), pp. 4-20 & 177-184(notes); and R. H. C. Davis. 'Warhorses of the Normans' Anglo-Norman Studies 10 (1987), pp. 67-82. The Middle Ages also produced one true breed in the Spanish Merino sheep. Though its origins remain somewhat shrouded in mystery, the Merino is also likely to have been the result of a conscious program of selective breeding. See esp: Robert S. Lopez. 'The Origin of the Merino Sheep' in: Robert S. Lopez. Byzantium and the World Around It (London: Variorum Reprints, 1978), pp. 161-8.

<sup>183</sup>Please see above, p. 45 & 47 respectively.

and appropriate nutrition. The so-called 'agricultural revolution' did provide new fodder crops and especially more winter foodstuffs. It cannot be denied that turnips, carrots, cole seed and clover, to name but a few, had an invigorating effect upon animal husbandry. However, to deny an ability to control and improve productive and aesthetic traits in animals before Bakewell is dangerous. Agriculture has been practiced by human beings for approximately 12,000 years. Animal characteristics were being changed to suit human needs long before the advent of manuals.<sup>184</sup> The concurrent existence of textual and practical agricultural traditions between the thirteenth and eighteenth centuries does not necessarily mean that the one had much to do with the other and, in fact, there is much to suggest the contrary. Until agricultural manuals are examined as independent texts, subject to the aspirations and idiosyncrasies of their authors, they should not be used to draw erroneous conclusions about the sophistication, or lack thereof, in England's pastoral history.

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<sup>184</sup>An excellent discussion of the origins and pre-history of agriculture generally, and animal husbandry in particular, can be found in: Peter J. Ucko and G. W. Dimbleby. The Domestication and Exploitation of Plants and Animals (Chicago: Aldine Publishing Company, 1969). This collection of symposium papers includes several papers on pre-historic selective breeding campaigns.

## CONCLUSION

Animal breeding in the eighteenth century did not undergo a revolution. Changes there were, but changes within a continuum. Selective breeding and breeding for marketable traits did not begin with the work of Robert Bakewell. Just as there were continuities in practice, there were continuities in the textual tradition. They were not both a part of the same continuum. Rather, the textual and practical traditions were two separate and distinct strands. Previous historians have failed to make this necessary distinction in any concrete way, thus creating an illusion. Practice and text should not be seen as a part of an undifferentiated whole. Recognition of the influence of class lines, and, most especially, the aspirations of the manual authors for increased social status, most clearly articulated in their quest for acceptance by the Royal Society, can assist in unraveling, distinguishing and characterizing both strands.

Examining the genre of didactic agricultural literature using parameters developed for the study of science and technology, rather than for economic history, can be peculiarly helpful. Viewed as independent texts, rather than uninteresting corollaries to weights, measures and ratios recorded elsewhere, farming manuals emerge as documents hovering between science and technology. Loosely in touch with both ends of the spectrum, they gravitated from the essentially practi-

cal medieval accounting guides to pseudo-scientific records of 'experiments' in the eighteenth century. Farming manuals should not be assumed to have influenced changes in agricultural practice any more than they were themselves influenced by science. Moreover, the previous assumption that the manuals could at least be relied upon to reflect contemporaneous practice is called in to doubt.

The practitioners of agriculture manipulated a technology, utilizing a practical and functional system of causal explanation designed to produce tangible results as efficiently as possible. Representatives of institutional science also developed and used systems of causal explanation. The mistake of previous historians has been to assume that the authors of farming manuals belonged to one of these two groups. Manual authors were neither wholly concerned with agricultural practices nor with the application of scientific principles to farming procedures. In fact, there is much in the manuals themselves that suggests that the textual tradition was in a constant state of flux, gravitating from one pole to the other over time. While serving certain practical purposes, especially that most clearly propounded in the medieval texts, namely guides for estate managers, there are intimations that the manuals also served as vehicles for a class of men who desired an enhancement of their position in society. This is especially evident in their quest for acceptance by the Royal Society. By extolling the virtues of agriculture and the nobility of purpose accruing to the 'Country Gentleman', the authors sought the specific attention of the Royal Society. The Society represented at once the best of institutional science and a club-like atmosphere which was not entirely exclu-



sive to the privileged. In short, science, through the Royal Society, looked like a realistic route into the company of persons of higher socio-economic status.

Obviously, there is more to the manuals than their stated agenda of agricultural improvement. If the early modern manuals were designed less as practical farming directives than as vehicles for social mobility, then their use by previous historians as sources for agricultural practice and change is called into doubt. If their primary purpose was not the improvement of farming techniques, it is no wonder that there was a distinct lack of detailed information and that the information provided remained largely static over time.

It has been demonstrated that a re-evaluation of the manuals can help substantially to alter the current models of agricultural change in late medieval and early modern England. This is particularly clear for the pastoral sector. Agricultural manuals exhibit no change in the content of their theories of animal generation and nutrition during the period in question. In fact, there is no appreciable difference between the explanations of the cause and effect of breeding strategies articulated by Grosseteste and Arthur Young. As a subject of enquiry, feeding saw some developments during the period of the so-called 'Agricultural Revolution'. These were largely the result of the availability of new feedstuffs and not of newer, more 'scientific' theories of digestion and nutrition. It is inappropriate to study agricultural manuals from the early modern era as separate and distinct from their medieval counterparts. The application of a socio-political division to agricultural practices is wrong and, as Russell's Like

Engend'ring Like has demonstrated, can lead to a facile assumption that medieval agriculture was simply inefficient and closed to the possibility of improvement. As the only other work fully dedicated to the pastoral husbandry of England, Trow-Smith's study, spanning the full extent of the history and pre-history of the British Isles, may be in need of some revision, yet remains the most coherent examination of livestock husbandry now available. Trow-Smith avoids many of the pitfalls which have hindered other historians, largely through a more judicious, if less than analytical, use of farming manuals as source for the agricultural practices of the past.

The agricultural manualists themselves should not be blamed for the inaccurate picture of the past which has been developed from their pages. Farming manuals, especially those of the early modern era, were literary products and require the same sort of interpretation which the historian would accord any other piece of writing. They are not records of weights and measures, seeding ratios, customs rates, tithes or sales values. They are the products of fertile minds with personal, political and social agendas. To ignore the context of these manuals is disastrous to their correct interpretation. No historian would attempt to use a similar literary creation, be it a novel, a letter or a diary, without giving some thought to the author's motives, the audience and the social milieu of the text in question. Agricultural manuals have been largely excepted from this rule and pastoral husbandry has been a particularly unlucky victim of insufficiently critical historians.

## BIBLIOGRAPHY

## Primary Sources

NB: Volumes listed are selected for their representation of pastoral husbandry. Works of particular value are marked with an asterisk.

\*'A Country Gentleman'. A New System of Agriculture or A Plain, Easy and Demonstrative Method of Growing Speedily Rich. London: 'printed for A. Millar in the Strand' 1755.

Anderson, James. Essays Relating to Agriculture and Rural Affairs. Edinburgh: 'printed for T. Cadell and W. Creech' 1775.

Anonymous. Dictionarium Rusticum, Urbanicum & Botanicum. London: 'J. Nicholson in Little Britain, W. Taylor in Avemary Lane, and W. Churchill in Paternoster Row' 1717.

\_\_\_\_\_. "The Husbandry." . In Walter of Henley and Other Treatises on Estate Management and Accounting, Dorothea Oschinsky. Oxford: Clarendon Press, 1971.

\_\_\_\_\_. Miscellaneous Dissertations on Rural Subjects. London: 'printed for G. Robinson' 1775.

\_\_\_\_\_. The Refined Practice of Agriculture, the First Science on Earth. London: [Gold-Smith's Kress Microfilm Collection has no publishing information available], 1792.

\_\_\_\_\_. Select Essays on Husbandry. Extracted From the Museum Rusticum and Foreign Essays on Agriculture. Containing a Variety of Experiments, All of Which Have Been Found to Succeed in Scotland. Edinburgh: 'printed by J. Balfour' 1767.

\_\_\_\_\_. "The Seneschaucy." . In Walter of Henley and Other Treatises on Estate Management and Accounting, Dorothea Oschinsky. Oxford: Clarendon Press, 1971.

Baker, John Wynn. Experiments in Agriculture, Made Under the Direction of the Right Honourable ... Dublin Society. Dublin: 'printed by S. Powell and Son, for the Author' 1765.

\_\_\_\_\_. A Plan for Instructing Youths in the Knowledge of Agriculture,

Published at the Request of The Right Honourable and Honourable Dublin Society. Dublin: 'printed by S. Powell and Son, 1765.

\_\_\_\_\_. Some Hints for the Better Improvement of Husbandry. Dublin: 'printed for L. Flin' 1762.

Ball, John. The Farmer's Compleat Guide. London: 'printed for G. Kearsley' 1760.

Banister, John. A Synopsis of Husbandry. Being Cursory Observations in Several Branches of Rural Oeconomy. Adduced From a Long and Practical Experience in a Farm of Considerable Extent... London: 'printed for G. G. and J. Robinson' 1799.

Belhaven, John Hamilton. The Country-man's Rudiments. Edinburgh: 'printed by the Heirs and Successors of Andrew Anderson' 1699.

Blagrove, Joseph. The Epitome of the Art of Husbandry. London: 'printed for Benjamin Billingsley' 1685.

\_\_\_\_\_. New Additions to the Art of Husbandry. London: 'printed for Benjamin Billingsley' 1685.

Blith, Walter. The English Improver... 'Clearly Demonstrated from Principles of Sound Reason, Ingenuity and Late but Most Certain Reall Experience.' London: 'printed for J. Wright at the King's Head in the Old Bayley', 1649.

\_\_\_\_\_. The English Improver Improv'd or the Survey of Husbandry Surveyed. London: 'Printed for John Wright at the King's Head in the Old Bayley' 1652.

Bond, Simon. Secrets of the Queen's Closet (originally: The Queen's Closet Opened). Ed. Tom Isitt. Southampton: Ashford Press, 1988 <1655>.

Bowden, Thomas. The Farmer's Director: Or, a Compendium of English Agriculture. London: 'printed for Richardson and Urquhart' 1776.

Bradley, Richard. The Gentleman & Farmer's Guide for the Increase and Improvment of Cattle. London: 'printed by J. Applebee, for W. Mears, at the Lamb Without Temple Bar' 1729.

\_\_\_\_\_. The Gentleman and Farmer's Guide, for the Increase and Improvment of Cattle, Vz. Lambs, Sheep, Hogs, Calves, Cows and ... Horses. London: 'printed by J. Applebee, for W. Mears' 1729.

'By a Gentleman'. Observations on Some Papers in That Very Useful Collection, Intitled, Museum Rusticum. To Be Continued Occasionally. With New Theoretical and Practical Pieces on Husbandry. London: 'printed for W, Sandby' 1766.

"Capitulare de Villis." edited by Patrick J. Geary. In Readings in Medieval History, 325-33. Toronto: Broadview Press, 1989.

Dickson, Adam. Husbandry of the Ancients... Edinburgh and London: 'printed for J. Dickson' 1788.

\_\_\_\_\_. A Treatise of Agriculture. Edinburgh: 'printed by A. Donaldson and J. Reid, for the Author and A. Donaldson' 1762.

Donaldson, James. Husbandry Anatomized. Edinburgh: 'printed by John Reid' 1697.

Dundonald, Archibald Cochrane. A Treatise; Shewing the Intimate Connection Which Subsists Between Agriculture and Chemistry, Addressed to the Cultivators of The Soil, to the Proprietors of the Fens and Mosses, in Britain and Ireland; and the Proprietors of the West India Estates. London: 'printed for the Author' 1795.

Ellis, William. A Compleat System of Experienced Improvements. Dublin: 'printed for George Faulkner in Essex Street' 1749.

\_\_\_\_\_. The Modern Husbandman, Or, the Practice of Farming. London: 'printed for and Sold by T. Osborne and M. Cooper' 1744.

\_\_\_\_\_. The Practical Farmer: Or, the Hertfordshire Farmer. London: 'printed for T. Astley and Stephen Austen' 1738.

Fitzherbert, Anthony. The Boke of Hvsbandry. English Dialect Society. London: Trubner & Co., 1882 <1534>.

Grosseteste, Robert. "The Rules of Robert Grosseteste." . In Walter of Henley and Other Treatises on Estate Management and Accounting, Dorothea Oschinsky. Oxford: Clarendon Press, 1971.

Hale, Thomas. (Gardener) A Compleat Body of Husbandry. London: 'printed for T. Osborne & J. Shipton in Gray's Inn; J. Hodge on London Bridge; T. Trye Nar Gray's Inn Gate; And S. Crowder & H. Woodgate in Pater-Noster Row' 1756.

Hales, Stephen. "An Account of Some Trials to Cure the Ill Taste of Milk, Which is Occasioned by the Food of Cows" Philosophical Transactions of the Royal Society 49 (1755/6): 339-47.

Hall, William Henry. A New System of Agriculture. [Gold-Smith's Kress Microfilm Collection has no publishing information available], 1795.

Harte, Walter. Essays on Husbandry. London: 'printed for W. Frederick and W. Johnston' 1770.

Hartlib, Samuel. The Compleat Husband-man. London: 'printed and to Be Sold by Edward Brewster' 1659.

- \_\_\_\_\_. Cornu Copia. A Miscellanium of Luciferous And Most Fructiferous Experiments, Observations and Discoveries, Immethodologically Distributed; to Be Really Demonstrated and Communicated in All Sincerity. [Gold-Smith's Kress Microfilm Collection has no publishing information available], 1652.
- \_\_\_\_\_. A Discoverie for Division or Setting Out of Land...With a Philosophical Quere Concerning the Cause of Fruitfulness. London: 'Printed for R. Wodenothe' 1653.
- \_\_\_\_\_. An Essay for the Advancement of Husbandry-Learning: Or Propositions for the Erecting of a College of Husbandry. London: Henry Hills, 1651.
- Henry, David. The Complete English Farmer, Or, a Practical System of Husbandry. London: 'printed for F. Newbery' 1771.
- Heresbach, Conrad. The Whole Art of Hvsbandry Contained in Fovre Bookes. Trans. Barnaby Googe. Ed. Gervase Markham. London: 'printed by T.C. for Richard More & to Be Sold at His Shop in S. Dunstanes Churchyard in Fleete-street' 1631.
- Hogg, William. The New Complete English Farmer; Or, The Whole Body of Husbandry Made Perfectly Easy. London: 'printed for A. Hogg' 1780.
- Home, Everard, Esq. "Some Observations on the Mode of Generation of the Kangaroo" Philosophical Transactions of the Royal Society 85 (1795): 221-39.
- Jacob, Giles. The Country Gentleman's Vade Mecum. London: 'printed for Wm. Taylor at the Ship in Pater-noster-row' 1717.
- Kames, Henry Home. The Gentleman Farmer. Being an Attempt to Improve Agriculture, by Subjecting It to the Test of Rational Principles ... London: 'printed for T. Cadell (and for T. Creech in Edinburgh)' 1776.
- Kent, Nathaniel. Hints to Gentlemen of Landed Property. London: 'printed for J. Dodsley' 1775.
- L'Estrange, Sir Roger. A Treatise of Wool and Cattel. In a Letter Written to a Friend Occasion'd Upon a Discourse Concerning the Great Abatements of Rent. London: 'printed by J. C. for W. Crook' 1677.
- Laurence, Edward. The Duty of the Steward to His Lord. London: 'printed for J. Shuchburgh' 1727.
- Lisle, Edward. Observations in Husbandry. London: 'printed by J. Hughs, for C. Hitch' 1757.
- Markham, Gervase. Cheape and Good Husbandry. London: 'printed by

Nicholas Okes for John Harrison & to Be Sold at His Shop in Paternoster Row' <5th Ed.>, 1631.

\_\_\_\_\_. Country Contentments: Or, the Husbandman's Recreations. Contayning the Wholesome Experiences in Which any Man Ought to Recreate Himself After The Toyle of More Serious Business. London: 'printed by William Wilson' <6th Ed.>, 1649.

\_\_\_\_\_. The Inrichment of the Weald of Kent. London: 'printed by W. Wilson, for E. Brewster, and George Sawbridge' 1656.

\_\_\_\_\_. Markham's Farwell to Husbandry...together with Many New Additions and Cheape Experiments. London: 'M.F. for Roger Iackson' 1625.

\_\_\_\_\_. Masterpiece. London: 'printed for G. Conyers at the Ring in Little-Britain, W. Wooten at the Three Daggers in Fleet-street and J. Clark at the Golden Ball in Duck-lane' <20th Ed.>, 1723.

\_\_\_\_\_. A Way to Get Wealth. London: 'E.G. for John Harison to Be Sold at the Gold Unicorn in Paternoster Rowe' 1638.

Marshall, William. "An Account of the Black Canker Caterpillar Which Destroys the Turnips in Norfolk" Philosophical Transactions of the Royal Society 73 (1783): 217-22.

\_\_\_\_\_. The Abstract and Review of the County Reports to the Board of Agriculture. . York: Thomas Wilson & Sons, 1818.

\_\_\_\_\_. The Abstract and Review of the County Reports to the Board of Agriculture. . York: Thomas Wilson & Sons, 1818.

\_\_\_\_\_. Experiments and Observations Concerning Agriculture and the Weather. London: 'printed for J. Dodsley' 1779.

\_\_\_\_\_. Minutes of Agriculture, Made on a Farm of 300 Acres ... To Which is Added a Digest, Wherein All the Minutes Are Systematized and Amplified... London: 'printed for J. Dodsley' 1778.

\_\_\_\_\_. Proposals for a Rural Institute, or College of Agriculture and Other Branches of Rural Oeconomy. London: 'sold by G. and W. Nicol' 1799.

\_\_\_\_\_. The Rural Economy of the Midland Counties Including the Management of Livestock in Leicestershire and Its Environs. . London: G. Nicol, Bookseller to His Majesty, Pall Mall; G.G. and J. Robinson, Paternoster Row; and J. Debrett, Picadilly., 1796.

Mascall, Leonard. The Gournement of Cattell. London: 'printed for Tho. Purfoot for Francis Falkner and to Be Sold at His Shop Neere St. Margaret's Hill in Southwarke, 1627.

- Maxwell, Robert. The Practical Husbandman: Being a Collection of Miscellaneous Papers on Husbandry, &c. Edinburgh: 'printed by C. Wright and Company, for the Author' 1757.
- Meager, Leonard. The Mystery of Husbandry. London: 'printed by W. Onley, for Henry Nelme' 1697.
- Mills, John. A New and Complete System of Practical Husbandry; Containing All That Experience Has Proved to Be Most Useful in Farming. London: 'printed for R. Baldwin' 1762-5.
- Monk, John. An Agricultural Dictionary, Consisting of Extracts from the Most Celebrated Authors and Papers... London: 'printed by G. Woodfall for the Author' 1794.
- Moore, Sir Jonas. England's Interest or the Gentleman and Farmer's Friend. London: 'printed for A. Bettsworth at the Red Lion in Pater-noster-Row' 1721.
- Mortimer, John. The Whole Art of Husbandry. London: 'printed by J.H. for H. Mortlack at the Phoenix, J. Robinson at the Golden Lion in St. Paul's Church-Yard' 1708.
- Newbury, Nathaniel. The Yeomans Prerogative, or the Honour of Husbandry. London: 'printed by J. Moxon, for J.N.' 1652.
- Nourse, Timothy. Campania Foelix, or a Discourse of the Benefits and Improvements of Husbandry. London: 'printed for Thos. Bennet' 1700.
- \*Parkinson, Richard. The Experienced Farmer, an Entire New Work, in Which the Whole System of Agriculture, Husbandry and the Breeding of Cattle, is Explained and Copiously Enlarged Upon... London: 'printed for G. G. and J. Robinson' 1798.
- Pennant, Esq., Thomas. "An Account of the Turkey" Philosophical Transactions of the Royal Society 71 (1781): 67-81.
- Peters, Matthew. The Rational Farmer, or a Treatise on Agriculture and Tillage. London: 'printed for W. Flexney' 1771.
- \*Plat, Sir Hugh. The Jewel House of Art and Nature: Containing Diverse Rare and Profitable Inventions, Together with Sundry Experiments in in[sic] the Art of Husbandry. London: 'printed by Elizabeth Alsop' 1653.
- Plattes, Gabriel. Practicall Husbandry Improved. London: 'printed for Edward Thomas' 1656.
- Puckle, James. England's Way to Wealth and Honour: In a Dialogue Between an Englishman and a Dutchman. London: 'printed for Sam. Crouch', 1699.



- Ringsted, Josiah. The Cattle Keepers Assistant; Or, Genuine Directions for the Countrygentleman, Sportsmen, Farmers, Graziers, Sarriers, &c. Being a Very Curious Collection of Well Authenticated Observations and Receipts (Made by Persons of Note and Experience) for the Curer of the Most Common Distempers Incident to Horses, Oxen, Cows, Calves, Sheep, Hogs and Dogs ... London: J. Dixwell, 1774.
- Smith, John. England's Improvement Reviv'd. London: 'printed in the Savoy by Thos. Newcomb for the Author' 1670.
- Stone, Thomas. An Essay on Agriculture, With a View to Inform Gentlemen of Landed Property, Whether Their Estates Are Managed to the Greatest Advantage. Lyn and London: 'printed by W. Whittingham' 1785.
- Switzer, Stephen. Ichnographia Rustica: Or, The Nobleman, Gentleman, and Gardener's Recreation. London: 'printed for J. and J. Fox' 1742.
- Taplin, William. Taplin Improved; Or, a Compendium of Farriery, Wherein is Fully Explained the Nature and Structure of That Most Useful Creature, a Horse... London: 'printed for W. Lane' 1796.
- Trusler, John. Practical Husbandry; Or, the Art of Farming, with a Certainty of Gain. London: 'printed for the Author' 1780.
- Tusser, Thomas. The Fiue Hundred Pointes of Good Husbandrie. Ed.s W. & Herrtage Payne, Sidney J. English Dialect Society. London: Trubner & Co., 1878 <1573, collated with 1577 & 1580>.
- Twamley, Josiah. Dairying Exemplified; Or, the Business of Cheesemaking. Warwick and London: 'printed for the Author' 1784.
- Walter of Henley. "The Husbandry of Walter of Henley." . In Walter of Henley and Other Treatises on Estate Management and Accounting, Dorothea Oschinsky. Oxford: Clarendon Press, 1971.
- Weston, Sir Richard. A Discours of the Husbandry Used in Brabant and Flanders. London: 'printed by William DuGard' 1650.
- Winter, George. A New and Compendius System of Husbandry. Containing the Mechanical, Chemical and Philosophical Elements of Agriculture. Bristol and London: 'printed by W. Routh' 1787.
- Worldidge, John. Systema Agriculturae. London: 'printed by T. Johnson for Samuel Speed Near the Inner Temple Gate in Fleet-street' 1669.
- 'Written by a Country Gentleman'. The Complete Grazier: Or, a General Dictionary of Husbandry. London: 'printed for J. Almon' 1767.
- Young, Arthur. A Course of Experimental Agriculture: Containing an Exact Register of All the Business Transacted During Five Years on Near 300 Acres of Various Soils. London: 'J. Dodsley, in Pall Mall'

1770.

\_\_\_\_\_. An Essay on the Management of Hogs. London: 'printed for W. Nicoll' 1769.

\_\_\_\_\_. The Farmer's Guide in Hiring and Stocking a Farm. Dublin: J. Exshaw, 1771.

\_\_\_\_\_. The Farmer's Kalendar. London: 'printed for Robinson and Roberts and J. Knox' 1771.

\_\_\_\_\_. The Farmer's Letters to The People of England & Sylvae, or Occasional Tracts on Husbandry and Rural Economics. London: 'Printed for W. Strahan; W. Nicol, No.51, in St. Patrick's Church-Yard; T. Cadell, in the Strand; B. Collins, Salisbury; and J. Balfour, Edinburgh' <3rd Ed.>, 1771.

\_\_\_\_\_. Rural Oeconomy: Or, Essays on the Practical Part of Husbandry ... to Which is Added. The Rural Socrates: Being the Memoirs of a Country Philosopher. London: 'printed for T. Becket' 1770.

Young, David. National Improvements Upon Agriculture, In Twenty-seven Essays... Edinburgh and London: 'printed For, and Sold by the Author' 1785.

## Secondary Sources

- Allen, Robert C., and Cormac O Grada. "On the Road Again with Arthur Young." Journal of Economic History 48 (1988): 93-116.
- Biddick, Kathleen. The Other Economy. Berkeley: University of California Press, 1989.
- Blakely, James & David H. Bade. The Science of Animal Husbandry. Reston, VA: Reston Publishing Company, Inc., 1985.
- Campbell, John R. & John F. Lasley. The Science of Animals That Serve Humanity. New York: McGraw-Hill Book Company <3rd Ed.>, 1985 <1969>.
- Cancian, Frank. The Innovator's Situation: Upper-Middle Class Conservatism in Farming Communities. Stanford, CA: Stanford University Press, 1979.
- Davis, R. H. C. The Medieval Warhorse: Origin, Development and Redevelopment. London: Thames and Hudson, 1989.
- \_\_\_\_\_. "The Medieval Warhorse." F. M. L. Thompson. In Horses in European Economic History, 4-20 & 177-84. Leeds: The British Agricultural History Society, 1983.
- \_\_\_\_\_. "Warhorses of the Normans." Anglo-Norman Studies 10 (1987): 67-82.
- Edwards, Peter. The Horse Trade of Tudor and Stuart England. Cambridge: Cambridge University Press, 1988.
- Ernle, Lord. English Farming: Past and Present. London: Frank Cass & Co., Ltd. <6th Ed.>, 1936 <1912>.
- Fleischer, Manfred P. "The First German Agricultural Manuals." Agricultural History 54 (1980): 1-15.
- Fussell, G. E. "Agricultural Science and Experiment in the Eighteenth Century: An Attempt at a Definition." Agricultural History Review 24 (1976): 44-47.
- \_\_\_\_\_. "Crop Nutrition in Tudor and Stuart England." Agricultural History Review 3 (1955): 95-106.

- \_\_\_\_\_. "The First Eighteenth Century Book on Cattle." Journal of the Ministry of Agriculture 42 (1935): 1235-43.
- \_\_\_\_\_. More Old English Farming Books From Tull to the Board of Agriculture, 1731 to 1793. London: Crosby Lockwood & Son, 1950.
- \_\_\_\_\_. The Old English Farming Books from Fitzherbert to Tull, 1523 to 1730. London: Crosby Lockwood & Son, Ltd., 1947.
- \_\_\_\_\_. "A Western Counties Farmer in 1700." Journal of the Ministry of Agriculture 39 (1932): 123--9.
- \_\_\_\_\_. The Classical Tradition in West European Farming. Newton Abbot: David & Charles, 1972.
- \_\_\_\_\_. Farming Technique from Prehistoric Times to the Present. Oxford: Pergamon Press, 1965.
- Goddard, Nicholas. "The Development and Influence of Agricultural Periodicals and Newspapers, 1780-1880." Agricultural History Review 31 (1983): 116-31.
- Grigg, David. The Dynamics of Agricultural Change: The Historical Experience. London: Hutchinson, 1982.
- Hoskins, W. G. "Regional Farming in England." Agricultural History Review 2 (1954): 3-11.
- Hunter, Michael. Science and Society in Restoration England. Cambridge: Cambridge University Press, 1981.
- Kerridge, Eric. Ed. Agrarian Problems in the Sixteenth Century and After. Historical Problems: Studies and Documents; General Editor G.R. Elton. London: George Allen & Unwin, 1969.
- \_\_\_\_\_. The Agricultural Revolution. London: George Allen & Unwin, Ltd., 1967.
- \_\_\_\_\_. The Farmers of Old England. London: George Allen & Unwin, 1973.
- Kranzberg, Melvin & William H. Davenport, ed's. Technology and Culture. New York: Schocken Books, 1972.
- Lennard, R. V. "English Agriculture Under Charles II." In Essays in Agrarian History, Ed. W. E. Minchinton, 161-86. , vol. 1. Newton Abbot: David & Charles, 1968.
- Leslie, Michael. "The Hartlib Papers Project: Text Retrieval with Large Datasets." Literary and Linguistic Computing 5 (1990): 58-69.
- Lionberger, Herbert H. Adoption of New Ideas and Practices. Ames, Iowa:

The Iowa State University Press, 1960.

- Lopez, Robert S. "The Origin of the Merino Sheep." In Byzantium and the World Around It, 161--8. London: Variorum Reprints, 1978.
- M<sup>==</sup>Donald, Donald. Agricultural Writers from Sir Walter of Henley to Arthur Young. New York: Burt Franklin <reprint>, 1968.
- M<sup>==</sup>Donald, Stuart. "Agricultural Improvement and the Neglected Labourer." Agricultural History Review 31 (1983): 81-90.
- Marshall, F. H. A. & John Hammond. The Science of Animal Breeding in Britain. London: Longmans, Green & Co., for The British Council, 1946.
- Mate, Mavis. "Pastoral Farming in South-east England in the Fifteenth Century." Economic History Review 40 (1987): 523-36.
- Meenan, James and Desmond Clarke. The Royal Dublin Society, 1731-1981. Dublin: Gill and MacMillan, 1981.
- Mingay, G. E. & J. D. Chambers. The Agricultural Revolution, 1750-1880. New York: Schocken Books, 1966.
- Oschinsky, Dorothea. Walter of Henley and Other Treatises on Estate Management and Accounting. Oxford: Clarendon Press, 1971.
- Ovitt, George Jr. The Restoration of Perfection. New Brunswick & London: Rutgers University Press, 1987.
- Pawson, H. Cecil. Robert Bakewell: Pioneer Livestock Breeder. London: Crosby Lockwood & Sons, Ltd., 1957.
- Riches, Naomi. The Agricultural Revolution in Norfolk. New York: Augustus M. Kelly <reprint>, 1967 <1937>.
- Russell, Nicholas. Like Engendr'ing Like. Cambridge: Cambridge University Press, 1986.
- Russell, Sir E. John. A History of Agricultural Science in Great Britain, 1620-1954. London: George Allen & Unwin Ltd., 1966.
- Seeborn, M. E. (née M. E. Christie). The Evolution of the English Farm. London: George Allen & Unwin, Ltd., <2nd Ed.>, 1952 <1927>.
- Shorter Oxford English Dictionary on Historical Principles. Oxford: Clarendon Press, <3rd Ed.>, 1967.
- Slicher Van Bath, B. H. The Agrarian History of Western Europe, A.D. 500-1850. Trans. Olive Ordish. London: Edward Arnold (Publishers) Ltd., 1963.

- Smithcors, J. F. Evolution of the Veterinary Art: A Narrative Account to 1850. Kansas City, Missouri: Veterinary Medicine Publishing Co., 1957.
- Spier, Robert F. G., and Donald K. Anderson, Jr. "Shakespeare and Farming: The Bard and Tusser." Agricultural History 59 (1985): 448-61.
- Thirsk, Joan. "Agricultural Innovations and Their Dispersal." In The Agrarian History of England and Wales, General Editor Joan Thirsk, 533-89. Cambridge: Cambridge University Press, 1985.
- \_\_\_\_\_. English Peasant Farming. London: Routledge & Kegan Paul, 1957.
- \_\_\_\_\_. "Horses in Early Modern England: For Service, for Pleasure, for Power." The Stenton Lecture 1977. University of Reading, 1978.
- Tribe, Keith. Land, Labour and Economic Discourse. London: Routledge & Kegan Paul, 1978.
- Trow-Smith, Robert. English Husbandry From the Earliest Times to the Present Day. London: Faber & Faber, Ltd., 1951.
- \_\_\_\_\_. A History of British Livestock Husbandry. London: Routledge & Kegan Paul, 1957.
- Tyler, Cyril. "The Development of Feeding Standards for Livestock." Agricultural History Review 4 (1956): 97-107.
- Ucko, Peter J. and G. W. Dimbleby, eds. The Domestication and Exploitation of Plants and Animals. Chicago: Aldine Publishing Company, 1969.
- Watson, Sir James Scott. "Some Traditional Farming Beliefs in the Light of Modern Science." Agricultural History Review 1 (1953): 4-8.
- Webster, Charles. The Great Instauration: Science, Medicine & Reform, 1626-60. London: Duckworth, 1975.