

The Breton Breed of Cattle in Britain: Extinction versus Fitness*

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ANIMAL breeding in the third quarter of the twentieth century has been characterized by the trade in so-called 'exotic' breeds between countries. In the enthusiasm for this process, many aspects of a previous migration of breeds in the nineteenth century have been ignored. It is usual to discuss the nineteenth-century situation in terms of exports of well-known breeds, especially the Shorthorn and the English Leicester. However, there were many migrations of less well-known breeds. One of these was the Breton (also called the Brittany).

Today the Breton is little known outside its centre of origin and has low numbers.¹ But, earlier, the breed was sufficiently plentiful and well-regarded to be exported. Breton cattle are said to have been taken to Quebec soon after its founding in 1541 and again in 1608; it is generally accepted that, with Normandy cattle, the Breton gave rise to the breed known variously as the Quebec Jersey, French-Canadian or Canadian.²

Breton cattle also went to the USA. One writer suggested that the Guinea cattle of Florida were derived from the Breton,³ but others have suggested that the Guinea cattle

owe their origin to the Dexter.⁴ Breton cattle may have been among cattle imported via the Channel Islands to New South Wales under the collective name of 'the St Helier breed' in the nineteenth century.⁵

In Great Britain, Breton cattle enjoyed several decades of popularity in the third quarter of the nineteenth century. The case history of this migration has important lessons for the present, especially in the context of the growing concern for conservation of rare and minority breeds.

I

Breton cattle are a French landrace, generally considered to be related closely to Channel Island cattle. The traditional criteria for this grouping are: proximity, conformation, high butterfat, yellow milk and butterfat and a yellow tinge to the skin. There are few data which allow any comparison of the frequency of protein polymorphisms, but two 'Brittany Shorthorns' screened by Bangham and Blumberg were both heterozygous for haemoglobins A and B, a polymorphism common in Channel Island cattle.⁶

* The authors' research was supported by a University of Adelaide Adelaide Research Grant 'Molecular Variation and Evolution of Domesticated Animals'.

¹ J J Lauvergne, 'The current status of cattle breeds in Europe', *World Animal Review*, 21, 1977, pp 42-47.

² L F Allen, *American Cattle: Their History, Breeding and Management*, New York, 1868; H E Alvord, 'The American cattle trade', *JRASE*, 2nd series, 13, 1877, p 356; J E Rouse, *World Cattle, III: Cattle of North America*, Norman, Oklahoma, 1973; M H French, I Johansson, N R Joshi and E A McLaughlin, *European Breeds of Cattle*, FAO Agricultural Studies No 67, Rome, 1966.

³ R C Auld, 'The segregations of polled races in America', *American Naturalist*, 23, 1889, pp 683.

⁴ J C Dollahon and M Koger, 'Inheritance of the Guinea trait in descendants of Florida Native cattle', *Journal of Heredity*, 51, 1960, pp 32-34. These authors suggested the relationship because Guinea cattle resembled the Dexter in the occurrence of a semi-lethal gene, which when heterozygous produced a viable dwarf calf, but when homozygous resulted in an inviable deformed 'bulldog' calf. The same gene has been said to occur in Breton cattle: see F A E Crew, 'The significance of an achondroplasia-like condition met with in cattle', *Proceedings of the Royal Society, London*, B95, 1923, p 246. This raises the possibility of relationship between the Breton and the Dexter.

⁵ F McCaffrey, *First Century of Dairying in New South Wales*, Sydney, 1909.

⁶ A D Bangham and D S Blumberg, 'Distribution of electrophoretically different haemoglobins among some cattle breeds of Europe and Africa', *Nature*, 181, 1958, pp 1551-1552.

At various times attempts were made to improve Breton cattle by crossing. Of the French breeds, only the 1760 importation of forty-five Bocage bulls (said to be at the suggestion of the then Bishop of St Pol de Leon) was thought to have left any mark. Its influence was said to be visible in the form of a grey tinge around the eyes and the muzzle in some individuals.⁷ Further crosses in the nineteenth century were controversial. Frere considered that crosses with the Ayrshire or the Jersey did not improve conformation and that the former reduced butterfat. He liked crosses with the Durham, and claimed that these were heavier and had better conformation, matured earlier, and yielded more milk, at least as high in butterfat as the Breton. As for the pure Bretonne cow, Frere remarked '... a leading farmer has been known to be unwilling to be *seen* buying one'.⁸

Coleman quoted correspondents who condemned such crosses.⁹

'Marchadour Zaout' (a *nom de plume*) informed Coleman that :

As a few instances among many, I may cite the monstrous puerility displayed, but esteemed as a *chef d'oeuvre* by its perpetrators (divers learned *agronomes*), in a cross between the Shorthorn bull and a Brittany cow; that with the Swiss bull — an equally wretched one; and ... the most rational attempt by far ... the Ayrshire ... My own opinion ... is that this animal, defective only (as a general rule) in size, is susceptible of all the amelioration needful by a judicious selection of parents from its own pure blood ...¹⁰

J C W Douglas, Manoir du Plessis, Chateaneuf du Fau, Finisterre, wrote to Coleman in similar terms:

... time and money has been spent by theoretical men in experimenting with different crosses, and thus West Highlanders, Devons, Swiss, Ayrshires, and now latterly Durhams, have been tried. These gentlemen-fancy farmers, and now and again an ambitious peasant proprietor — with more coin and less brains than others of his fraternity, achieved great 'Kudos' and cause for speechifying and self-

congratulation. While the rank and file of the *petits cultivateurs* ... are left utterly aside ... if indeed, the poor little starveling cow, the hardy and shapely milk-giver of the Breton cottar ... is ... to escape being swamped by a system of universal mongreling, it is not due to the agricultural intelligence of the period, but to the stolid rough common sense of the native ... who has to live by his trade.¹¹

'Marchadour Zaout' pointed out that in the Bretonne cow, '... smallness of size is a desideratum to many people — for from what other source can the owner of a mere plot of ground obtain a fair supply of home-produced milk and butter?'¹²

The Bretonne cow could be as small as thirty-two inches at the withers. Thirty-six inches was considered average. Under improved conditions, forty inches might be attained.¹³ Writers mentioned the charming head and fine bone.¹⁴ The horns were described as fine '... like that of an Alderney, but thinner and tapering away from the head ...'¹⁵ The colour was typically black-and-white in the Morbihan race, and red-and-white in Cornouaille.¹⁶ The type is illustrated in Figs 1 and 2.

Frere criticized Breton cattle for the narrow chest, light hindquarters and 'enormous belly'. It was generally accepted that these characteristics were at least in part the result of harsh conditions. Breton cattle were found on 'sandy wastes' and 'poor granitic soil'. The cows might be tethered, or have to graze the roadsides; and the only supplementary feed was 'A scanty dole of bog hay, and haply a ration of pounded gorse or furze ...'¹⁷

Breton cattle had the reputation of being healthy. They were also said to be hardy, although many were kept in at night or in stormy weather. They were often housed in the owner's cottage. This close association with people probably contributed to the

¹¹ *Ibid*, p 151.

¹² *Ibid*, p 148.

¹³ Anon, 'Report of the Stewards of Stock at the Battersea Show', *JRASE*, 23, 1862, p 372; Coleman, *op cit*, p 148.

¹⁴ Frere, *loc cit*, p 215.

¹⁵ Anon, *loc cit*, p 372.

¹⁶ Frere, *loc cit*, p 213.

¹⁷ Frere, *loc cit*, p 215; Coleman, *op cit*, pp 147, 149.

⁷ P H Frere, 'Some account of Brittany cows. Taken from some notices by M Jamet, of Rennes', *JRASE*, 24, 1863, pp 213-216.

⁸ *Ibid*, p 215.

⁹ J Coleman, *The Cattle of Britain*, 1875, pp 146-151.

¹⁰ *Ibid*, p 148.

characteristics of docility and being easily managed.¹⁸

Milk yield was steady and could continue as long as eighteen months after calving.¹⁹ The daily average ranged from one to three gallons.²⁰ Two and a half gallons were said to yield one pound of butter.²¹ This compares well with the more usual yield of one pound of butter from three gallons of 'average' milk with 3.5 per cent butterfat. The butter was prized for its '. . . quality, colour and especially the *flavour* . . .';²² and, with the exception of Jersey butter, was '. . . said to be not only more solid and waxy in texture, but to have a finer aroma than that produced from other breeds . . .'²³

II

It is not clear when Breton cattle were first imported to Great Britain. Early records often lump together cattle of the Channel Island group and, even for a breed as well known as the Jersey, early importations have not been easy to trace.²⁴ Some Breton cattle may have been included under general terms such as 'French cattle' in the late eighteenth and early nineteenth century.

At the 1856 Chelmsford Royal Show, M Ris Allier, Directeur-Fondateur de la Colonie de Petit-Bourg, France, was awarded prizes in the classes for Foreign Cattle for his home-bred Breton bull (Tom Puce) and cow (Rosa Bonheur). Both animals were black-and-white.²⁵

At the Canterbury Royal Show in 1860, Samuel Camfield Baker, The Pheasantry, Beaufort St Chelsea, Middlesex, received a prize in the Other Established Breeds classes for an 'In-calf Bretonne Cow, breeder unknown'.²⁶ The following year, at Leeds, Mr Baker was successful with a bull bred

by himself and with three heifers.²⁷ Hobbs reported that the black-and-white Bretons were '. . . good of their order. Indeed, the bull was very beautiful; his head and eye were a complete study.'²⁸

The 1862 Royal Show at Battersea had separate classes for Breton cattle. Mr Baker won a gold medal for his four-year-old bull, Prince, beating the French exhibits. All the animals were black-and-white except the gold medal cow, who was white and roan.²⁹ A reporter wrote, '. . . an excellent class of Bretons to which England contributed largely'.³⁰ However, apart from Prince, the prizewinners were all from France.

According to Coleman, Mr Baker was largely responsible for the introduction of Breton cattle as house cows. His selling points were docility and that the Bretons were more economical than Alderneys. This claim was upheld, one enthusiast going so far as to say that four Bretonne cows could be kept for one Alderney.³¹ Messrs Baker informed Coleman: 'They are universally admired for their diminutive size . . . and for all small farms from two acres (now so much in fashion amongst ladies) they are specially adapted.'

Another writer noted: 'They are so docile, and bear tying up so well, besides living on 10 lbs of fodder a day, that the Bretonne cow is not infrequently reckoned as part of the luggage of families coming up to town for the season.'³² For those who did not include a Bretonne in the baggage, '. . . not only have specimens been purchased by wealthy proprietors as a matter of curiosity, but also dairies set up by those who live by the sale of milk in the environs of London . . .'³³ Breton cattle also spread to Scotland. They were kept by the Comte de Flahault (in Clackmannanshire), the Duke of Montrose,

¹⁸ Coleman, *op cit*, p 149.

¹⁹ Anon, *loc cit*, p 372.

²⁰ Coleman, *op cit*, p 146.

²¹ Frere, *loc cit*, p 214.

²² Frere, *loc cit*, p 213.

²³ X A Willard, 'The American butter factories and butter manufacture', *JRASE*, 2nd series, 7, 1871, p 4.

²⁴ See for example papers in J Boston (ed), *Jersey Cattle*, 1954.

²⁵ *JRASE*, 17, 1856, p xxvi.

²⁶ *JRASE*, 21, 1860, p ix.

²⁷ *JRASE*, 22, 1861, pp xvii-xviii.

²⁸ W F Hobbs, 'Report on the Exhibition of Live Stock at Leeds',

JRASE, 22, 1861, p 223.

²⁹ *JRASE*, 23, 1862, pp xlvi-xlvii.

³⁰ Anon, *loc cit*, p 372.

³¹ Coleman, *op cit*, p 147.

³² Anon, *loc cit*, p 372.

³³ Frere, *loc cit*, p 213.

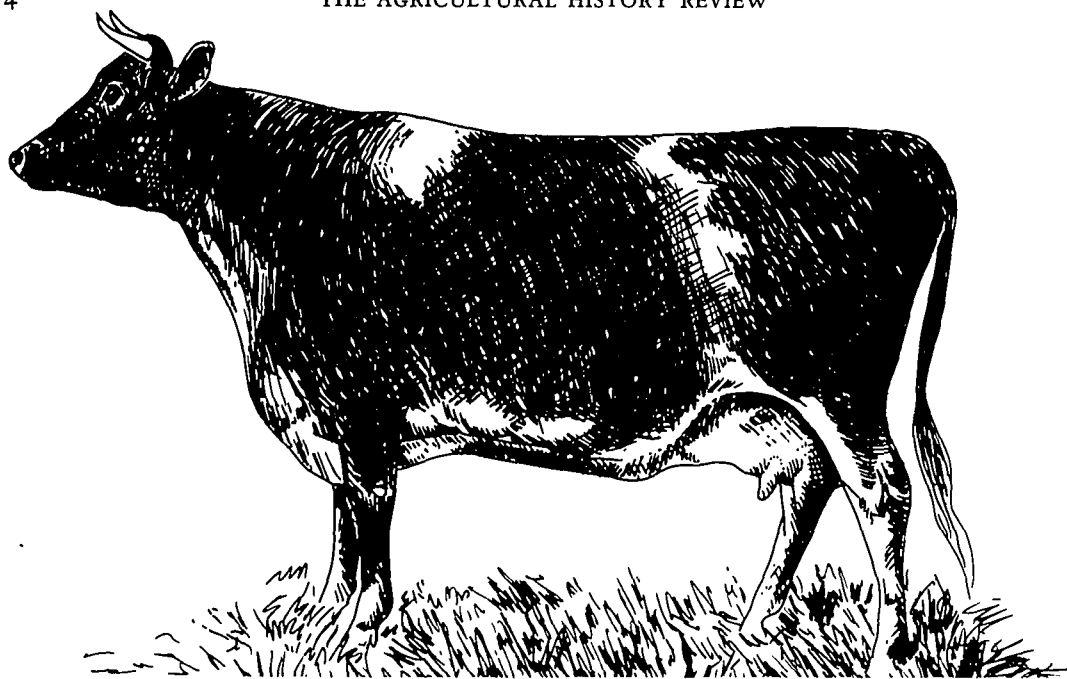


FIGURE 1 Bretonne cow, drawn after Harrison Weir's picture in J Coleman, *The Cattle of Britain*, 1875.

and a Mr Fleming kept 'a group' with his Ayrshires.³⁴

The above information indicates that the main niche occupied by the Bretonne in Great Britain was that of the house cow, kept largely by the middle and upper classes who did not have a home farm to supply dairy products, and sometimes by wealthy farmers and landowners who were attracted by the novelty and by the high butterfat. High yields in a house cow can create an embarrassing surplus; and a cow with a moderate but consistent yield over a lengthy period (such as was attributed to the Bretonne) is preferred. High butterfat is also appreciated, as a moderate milk production then results in ample cream, fresh butter and cream cheese with relatively small amounts of skim milk and buttermilk. In addition, the Bretonne had intangible assets such as placidity, pleasing appearance and novelty.

Breton cattle continued to be exhibited at the Royal Show. Their success was variable, because most of the time they had to

compete in classes for Other Established Breeds. At Newcastle upon Tyne in 1864, all the prizes went to Suffolks, and a critic complained that these deserved '... a better place than a class ... of themselves and the nondescript Breton race'.³⁵ At Leicester in 1868, Breton cattle did not appear in the prize list, but the judges were kinder, and wrote, 'We cannot close this brief Report without a word in commendation of two exquisite Brittany cows shown in class LI, one of which especially appeared to be perfect of her kind.'³⁶ However, in 1869, at Manchester, Thomas Statter, Stand Hall, Whitefield, Manchester, came second in the class for Other Established Breeds, Cow over three years old, with his home-bred blue-and-white cow, Rose.³⁷

The Breton had special classes in the section for Foreign Cattle at the 1879 Kilburn Royal Show. Bowstead reported: 'Of Bretons, a diminutive but symmetrically-made breed, closely resembling

³⁴ H H Dixon, *Field and Fern*, 1865, vol 1, pp 329 and 352; vol. 2, p 307.

³⁵ J D Dent, 'Report to the Council on the cattle exhibited at Newcastle', *JRASE*, 25, 1864, p 431.

³⁶ E Bowly, 'Report on the Exhibition of Live Stock at Leicester', *JRASE*, 2nd series, 4, 1868, p 443.

³⁷ *JRASE*, 2nd series, 5, 1869, p lxi.

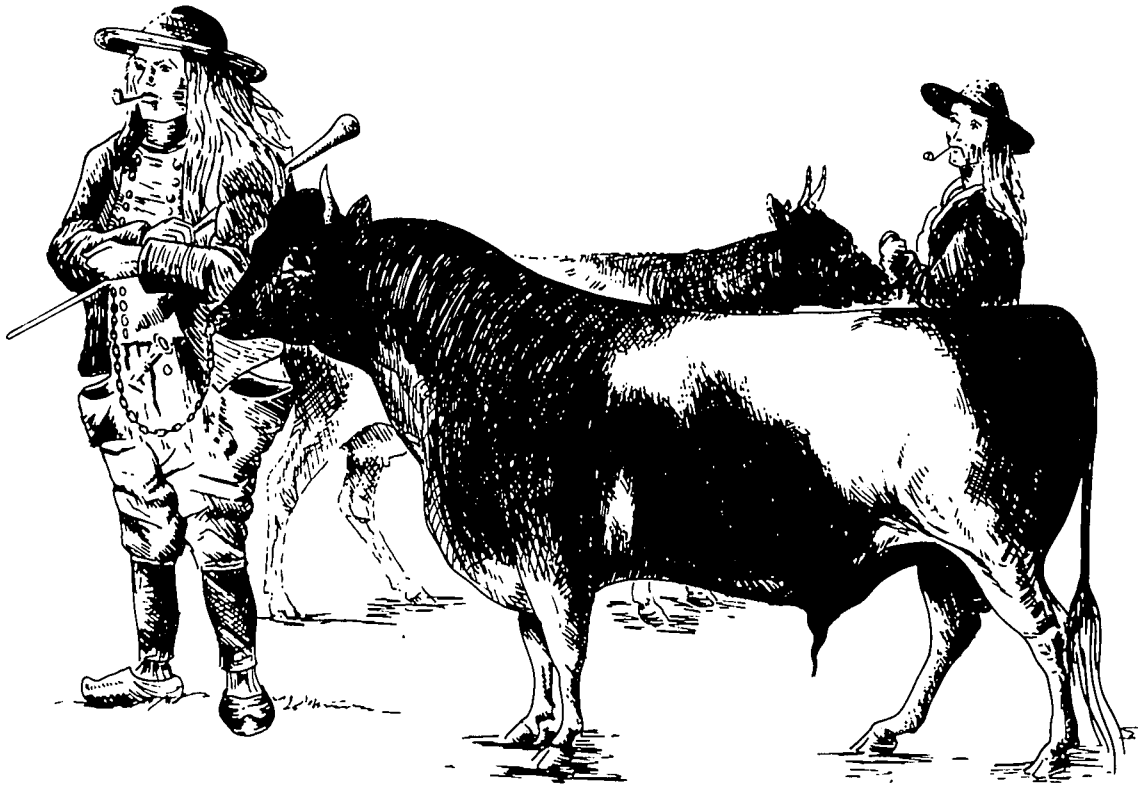


FIGURE 2 Breton bull, drawn after the picture by J C W Douglas in J Coleman, *The Cattle of Britain*, 1875.

the Kerries, there were only eight entries . . . The sole representative in Bulls over Two-years-old was "Jobie", bred in France, but exhibited by Mr Albert Dixon, of Windsor. This was a thickly made compact little fellow, with famous crops and loins, deep ribs, prominent rounds, broad chine and small bone, his great fault being the too high setting-on of the tail, characteristic of the breed. "Little John", the only Yearling Bull sent, had wonderfully big forequarters . . . Mr Albert Dixon . . . swept off all the prizes for Breton cows with three pretty little well proportioned creatures, the *premier* one having the reputation of yielding 10 quarts per day of rich milk. Her bag, which was well-formed, looked equal to the quantity and more. Mr Ladwick's "Polly", though not allowed a prize, was a true specimen of the Breton. In the Heifer Class there were only two entries, both belonging to Mr H B Spurgin of Northampton; "Lady Jane",

the winner, though only two years and six months old, being in full milk and displaying a right good bag.³⁸

Despite this encouraging report, there do not seem to have been any more Breton cattle exhibited at the Royal Show. The breed did not appear in later accounts of livestock kept in the British Isles. For example, it was omitted from the later edition of Coleman, published in 1887.³⁹

Coleman had noted a decline in the number of Breton cattle a few years earlier. He wrote, ' . . . at first sight their almost total neglect in the present day would lead to the impression that their asserted superiority for the purpose of the small dairy was not founded on fact. We believe, however that these two contradictory positions are reconcilable, and that the good

³⁸ T Bowstead, 'Report on the British and Foreign cattle exhibited at Kilburn', *JRASE*, 2nd series, 15, 1879, p 637.

³⁹ J Coleman, *The Cattle, Sheep and Pigs of Great Britain*, 1887.

qualities of the Breton cow have been little, if at all, overrated.⁴⁰

Coleman explained the decline in two ways. The first was the reduced number imported, because '... the cattle disease regulations have to some extent interfered ...' He noted that 'Messrs Robertson & Co, Eaton Farm, Cobham, Surrey, are now the only importers of cattle from Brittany.' Secondly, the shortage of Breton bulls raised difficulties for a breed in which most animals were kept as house cows. Coleman's supposition that Bretonne cows were '... too small to be safely crossed with any English bull ...' was incorrect. A yearling bull of most breeds should not have been too heavy. Pregnancy and parturition with a calf sired by a larger breed should not have been a problem, as was demonstrated by Joubert and Hammond in crosses between South Devon bulls averaging 2464 lb and Dexter cows of 535 lb.⁴¹ However, the use of bulls from other breeds would reduce the number of Breton cattle available, especially when imports from France became difficult.

A third reason is suggested by a comment reported by Frere: 'Remove her to rich land and she will take in much food, but the yield of milk never increases, and as she fattens her milk will dry up.'⁴² There is evidence that an increase in size was encouraged by some breeders — and by judges. At Battersea Show in 1862, 'The prizes were generally awarded to the larger specimens, which were not so much fancied for their milk in toy dairies as the smaller ones from the more mountainous parts of Brittany, where the pasture is scanty.'⁴³ The descriptions of 'Jobie' and of 'Little John' at Kilburn in 1879 emphasize their beef characteristics. The white-and-roan cow at Battersea, and the blue-and-white cow at

Manchester, hint at a Shorthorn cross. Macdonald and Macdonald who described the Breton as '... one of the most valuable ...' of French breeds, ascribed some of the value to crossing with the Shorthorn.⁴⁴ It is possible that 'improvements' in conformation were at the expense of characteristics which made the Bretonne a desirable house cow.

A further possible reason is that the quarantine difficulties involved in bringing cattle from France favoured the spread of two Irish breeds in Britain. The Kerry (to which Bowstead likened the Breton) was already known, and the Dexter was beginning to be recognized to be useful for smallholdings and for households.⁴⁵ Finally it is said that the gene which when homozygous causes 'bulldog' calves, a syndrome usually associated with the Dexter, also occurs in the Breton.⁴⁶

III

Although the Breton only occupied a small ecological niche in Great Britain, this does not mean that the historical and biological importance of the breed is small. It provides a case history which contradicts the commonly held belief that the decline and extinction of breeds of livestock is simply the consequence of the Darwinian evolutionary paradigm, epitomized by Herbert Spencer and Thomas Huxley's phrase 'survival of the fittest'.⁴⁷ This simplistic approach fails to recognize the role of both random factors and social systems.

Random factors have only recently been accorded full recognition as a major force in evolution, eg, non-Darwinian evolution

⁴⁰ Coleman, *op cit*, 1875, pp 146-7.

⁴¹ D M Joubert and J Hammond, 'A crossbreeding experiment with cattle, with special reference to the maternal effect in South Devon-Dexter crosses', *Journal of Agricultural Science*, 51, 1958, pp 325-341.

⁴² Frere, *loc cit*, p 215.

⁴³ Anon, *loc cit*, p 372.

⁴⁴ W Macdonald and J Macdonald, 'The agricultural features of the Paris Exhibition', *JRASE*, 2nd series, 15, 1879, pp 223-224.

⁴⁵ W Hooper, 'Kerry and Dexter cattle', *JRASE*, 3rd series, 9, 1898, pp 667-677.

⁴⁶ Crew, *loc cit*, p 246.

⁴⁷ For example I M Lerner and H P Donald, *Modern Developments in Animal Breeding*, 1966; P A Jewell and G L H Alderson, 'Genetic conservation in domestic animals: purposes and actions to preserve rare breeds', *Journal of the Royal Society of Arts*, 125, 1977, pp 693-710.

or neutral allele theory.⁴⁸ The very success of the Darwinian evolutionary paradigm prevented a recognition of Sewall Wright's emphasis on genetic drift in his controversy with the proponent of 'fitness', R A Fisher, a controversy which involved not only evolutionary theory but also livestock breeding.⁴⁹

Social factors are often superimposed upon random ones to further complicate attempts to understand the decline and extinction of breeds. Whereas in the theory of evolution by natural selection 'fitness' is defined in terms of leaving the most genes in the next generation, R A Fisher's very choice of the word 'fitness' inevitably created a problem of value judgement. 'Fitness' in the show ring, or 'fitness' in different traits of agricultural production, differ from each other, and sometimes also from 'fitness' in the evolutionary sense.

Thus, in more recent years a few researchers have attempted to integrate 'fitness' with due allowance for the complexities of the real animal-breeding world, recognizing the important roles played by fads, fashion, agribusiness pressures and breed society interests, all superimposed upon changing economic and social patterns. For example, Hickman points out: 'Academic and bureaucratic influences on funding detract from effective genetic resource management and divert attention from the real problems to rare and endangered breeds in the industrialized areas of the northern Mediterranean region.'⁵⁰ In discussing the vacant niches left by agribusiness pressures in the USA, Hickman comments: 'It is difficult to believe that in all of North America there is no breed of medium size and production for use on

small farms, bred pure and maintained on marginal land areas to supplement family income.'⁵¹

Allowing for the much larger size of even 'small' farms in the USA when compared with Europe, that sentence of Hickman's could summarize the situation for the Breton in Brittany and in Britain. Here was a very small breed of cattle, ideal for small farmers, able to thrive on marginal conditions where larger breeds would fail to yield their full productive potential, or in some cases simply fail to survive. Furthermore, as has been shown by the first-hand reports of British and American writers of the nineteenth century, the unique qualities of the Breton were appreciated, not only by Breton small-holders and by pioneers in the New World but by some of the British landed gentry and show-ring exhibitors. However, the élite, less dependent on the qualities of this special breed, could afford to be fickle. We note that, despite the complimentary comments on the Breton at the Royal Show, the representation of the breed quickly declined. But the evidence of contemporary writers makes it clear that the decline was not due to any lack of biological or economic fitness. The main reasons were the difficulty of importation because of new quarantine regulations and the availability of the similar Dexter and Kerry which, coming from Ireland, were not subject to the same quarantine requirements. Other factors, such as the decline in milk yield with over-generous feeding or in crossbreds, were largely due to mismanagement. The main potentially disadvantageous biological factor was the occurrence of the dwarfing gene.⁵² But the same gene did not displace the Dexter from its niche in England⁵³ and, in heterozygotes, was regarded as an advantage in the Guinea cattle of Florida.⁵⁴

⁴⁸ M Kimura, *The Neutral Theory of Molecular Evolution*, Cambridge, 1983.

⁴⁹ C M A Baker and C Manwell, 'Population genetics, molecular markers, and gene conservation in bovine breeds', in C G Hickman (ed), *World Animal Science*, vol 11, *Cattle and Buffalo Resources*, Amsterdam, in press.

⁵⁰ C G Hickman, 'Management of animal genetic resources', *Proc 2nd World Congress on Sheep and Beef Cattle Breeding*, vol 1, Pretoria, 1984, paper no 10, p 1.

⁵¹ *Ibid*, p 5.

⁵² Crew, *loc cit*, p 246.

⁵³ G B Young, 'Population dynamics of the Dexter breed of cattle', *Journal of Agricultural Science*, 43, 1953, pp 373-374.

⁵⁴ Dollahon and Koger, *loc cit*, pp 32-33.

In the last thirty years the import of exotic breeds throughout the world has focused on the fast growth rate, for obvious economic reasons in beef production. However, more recently this enthusiasm has been tempered by a recognition that in many countries any additional agricultural expansion will have to involve lands which are often markedly suboptimal for high-production-rate breeds.⁵⁵ It has been found that, when all factors are considered, the less popular indigenous breeds often perform better economically in the long term.

Besides such environmental factors there are also important social factors which have been neglected. The last forty years have witnessed a resurgence of interest in rare and unusual breeds of livestock, and concern over extinction.⁵⁶ The last twenty years have also witnessed a growing realization of the problems which have arisen in the continual 'drift from the land' which has occurred over the last century. Some governments have tried to slow down that drift from the land in a belated recognition of the role of the small farmer, both in efficient agricultural production and in social stability. In addition, as part of the environmental movement in industrialized societies, there has also been a small counter-migration, from the city or suburb to the land with emphasis on self-sufficiency. Thus, there is likely to be in the future a greater need for breed diversity, as well as a greater recognition of the cultural and social

justifications for keeping minority breeds.⁵⁷ In that perspective the Breton might well serve a special need and return to its original high esteem. Fortunately there are still some pure Breton cattle in Brittany, distinct from the descendants of the Shorthorn crosses which evolved into a separate breed, the Armorican.⁵⁸

IV

Breton cattle are an ancient landrace which evolved in a milieu of harsh conditions and small farms. In the nineteenth century, a dichotomy of attitude to the breed developed. 'Progressive' agriculturalists sought to change it by crossing, while traditional farmers with small holdings resisted change. In Great Britain, imported Breton cattle were valued by the upper classes, because the traits which made the Bretonne economic to the small farmer also made her a good house cow. The subsequent exclusion of Breton cattle from the latter niche in Great Britain was not due to the intrinsic properties of the breed. Possible causes were the reduction of imports from France because of quarantine regulations; the inaccessibility to pure Breton bulls by many owners of Bretonne house cows; emphasis by British breeders and judges on beef conformation; and the availability of Kerry and Dexter cattle from Ireland. It is concluded from this case history that the popularity of a breed is not, as suggested by some writers, solely or mainly a function of fitness for a particular niche.

⁵⁵ For example H Hamburger and K A Ramsay, 'The current status and future of animal production and breeding in developing countries: the Southern African region, *Proc 2nd World Congress of Sheep and Beef Cattle Breeding*, vol 1, Pretoria, 1984, paper no 3, pp 1-31.

⁵⁶ W Landauer 'Shall we lose or keep our plant and animal stocks?', *Science*, 101, 1945, pp 497-499; M L Ryder, 'Why should rare breeds of livestock be saved?', *International Zoo Yearbook*, 16, 1976, pp 244-49; J J Lauvergne, 'Organisation of the conservation and management of genetic stocks of large farm animals', *Animal Genetic Resources Conservation Management*, FAO Animal Production and Health Paper No 24, Rome, 1981, pp 318-331; K Majjala, A V Cherekaev, J M Devillard, Z Reklewski, G Rognoni, D L Simon, and D Steane, 'Conservation of animal genetic resources in Europe, Final Report of an EEAP Working Party', *Livestock Production Science*, 11, 1984, pp 3-22.

⁵⁷ Baker and Manwell, *loc cit*.

⁵⁸ French *et al*, *loc cit*; Rouse, *op cit*, I, *Cattle of Europe, South America, Australia and New Zealand*, 1970. In 1962 the Armorican amalgamated with the Main Anjou to form the Rouge de l'Ouest.