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As I see it
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The revival of Great Britain after the 1939-1945 war was signalled by a national Festival in 1951, designed as a joyful celebration of the best of British culture, science, technology – and food

London. This issue's column continues the theme of my column published in the June-July issue of *WN*, on the achievements of the great nutrition scientist, statesman and Nobel Peace prize-winner, John Boyd Orr. As I said at the time, I have a special interest in Boyd Orr's vision and work, because he was the founder-director of the Rowett Research Institute as from a century ago, from 1914 to 1945, and I was the fourth director, from 1982 to 1999. In this column I continue the story of the work of the Rowett after Boyd Orr, and its world-leading achievements in the development of global industrial agriculture systems, up to my time as director.

UK post-war nutrition
Sustaining a nation

Every nutrition student knows that the national British wartime food and nutrition policy was crucial in sustaining the nation and helping to withstand the force of

Hitler's Germany. National self-sufficiency in food doubled, from a third to about two-thirds of all the population's needs. Food security was crucial to national security. This required a revolution in agricultural policies, with a focus on production of meat, milk and eggs for protein, and butter, fats and oils and sugar for energy. A dramatic intensification and higher productivity in animal husbandry was needed, as well as a modest provision of fruit and vegetables, to supply what was then seen as a balanced diet. This is where the Rowett came in. It became the leading British and perhaps also European scientific research institute whose task was to increase the production of animals and their produce.

It cannot be emphasised too often, that at that time – within the lifetimes of all who like me were born before or during the war – the main British public health nutrition problem, seen as a crisis among 'vulnerable groups' of the population, was agreed to be food and nutrition insecurity, undernutrition, lack of specific nutrients, and those infectious diseases which were commonly considered to be nutrition-related. This was very obviously true in all European countries that had been ravaged by the war, most of all Germany, northern France, the Low Countries, the Eastern European countries, and the USSR. That is to say, the main concerns of influential British nutrition scientists, working then in close collaboration with government and industry to devise and enact public policy, was then much the same as they are now in Asia and Africa.



Here are eight of the full-page advertisements in the official 1951 Festival of Britain programme: Every one is for processed products or else for and alcoholic drinks, none of them is for fresh food

Already though, the nature of the food manufacturing industry was changing fast, in part impelled by the many technological developments invented and applied in the

war. More food products became more processed. In 1951 the then UK democratic

socialist government, elected with a landslide victory in 1945, commissioned the Festival of Britain (see picture at the beginning of this column). Deliberately echoing the Great Exhibition of 1851, the Festival was smaller scale, but it was designed to usher in a new age of fair wages and equitable social services, in which industry, science, education and the arts would flourish. It was also designed, as every schoolchild who visited it may fondly remember, as fun.

Pertinent to my theme here, are the full page advertisements in the official programme, eight of which are shown above. These are for processed products and alcoholic drinks, all with one exception manufactured in the UK. They are as you see, tinned processed peas; tinned biscuits; tinned baked beans formulated by the US-based manufacturer Heinz; a tinned malt extract to be added to milk; beer (two advertisements from 'My Goodness, My Guinness'; liquor; and baby food, apparently as supplied to the Royal infants. There were no advertisements for any type of fresh or minimally processed food. Already, brands were being emphasised. This was a sign of things to come. At that time British agriculture and food policy was focussed on the provision of food, and tinned, bottled and packaged processed foods were seen as a convenient durable bonus for households.

World hunger and the Cold War

Sir John Boyd Orr as he then was, did not return to the Rowett Research Institute after the war. He had been invited in 1943 to attend the UN Conference on Food and Agriculture which the then US President Franklin D Roosevelt called from 18 May to 3 June. Representatives from 44 national governments gathered in Hot Springs, Virginia. Boyd Orr was invited not by the UK government, but by Lester Pearson of Canada, himself a future prime minister and Nobel laureate.

The UK government had refused to include Boyd Orr in its delegation because, as his young colleague then son-in-law David Lubbock told me, he was seen to be too radical. But Lester Pearson, prominent in the conference, arranged for Boyd Orr to speak after hearing endless platitudes from numerous government delegations. Exasperated, Boyd Orr let rip in his speech about the need for a war on world hunger, and that talk had to move to action. He captivated his audience, but he was nonetheless so disgusted with the conference that he left for some days walking in the countryside to calm down. However, on his return to the conference he was immediately taken aside and asked to be the founding director-general of the UN Food and Agriculture Organization (FAO).

He accepted. His vision was to create a World Food Bank, to guarantee basic food security. This plan was to buy surpluses from North America and eventually from

other countries, and to use these reserves to feed and nourish impoverished and

displaced populations. These ideas were parallel with those of John Maynard Keynes, who as one of the architects of the World Bank and the International Monetary Fund saw these great institutions as guarantors of equity.

But this never happened. The reason was that both the US and the USSR saw food supplies and food aid as instruments not of peace but of power, just as the great powers do now. So Boyd Orr's plans and pleas came to nought. Therefore after three years of struggle he resigned from FAO, complaining that all the most dominant UN members states wanted him to do was to generate endless information with tables of food needs and food production, without any power to do anything about the world's problems. In 1949 he won the Nobel Peace Prize (1), became Lord Boyd Orr of Brechin, and retired to Scotland after a spell in the City of London investing money on friends' advice and so safeguarding his pension and retirement. He died in 1971.

The Rowett Research Institute
After Boyd Orr



The five directors of the Rowett Research Institute since its foundation in 1914: John Boyd Orr, David Cuthbertson, Kenneth Blaxter, myself (at the time), and the current director Peter Morgan

The five directors of the Rowett from 1914 to now, are shown above. This column takes up the story from when John Boyd Orr left the Rowett to become FAO director-general, and outlines some of the work and achievements of Boyd Orr's first two successors, up to my time as Director.

David Cuthbertson. Production! Production!

From 1945 to 1965 the Director was David Cuthbertson. Like Boyd Orr he was a distinguished medical academic with a special interest in human nutrition, in his case particularly zinc metabolism and the effects of trauma. He told me that on arrival he was prohibited from doing any human nutrition and instructed to devote the Rowett exclusively to animal nutrition. As I mentioned above, the national priority at that

time was production of as much meat, milk and butter as cheaply as possible, so that even the poor could afford such foods, seen as mainstays of the national diet.

I should explain that the Rowett was formally under the control of the agriculture division of the Scottish Office, the national branch of the UK government responsible for various affairs in Scotland, including agriculture. In this respect it was similar to the chain of land grant colleges set up in the 19th century in most states of the US, including Cornell (New York), Rutgers (New Jersey), Purdue (Indiana), Michigan State, and Tuskegee (Alabama) whose tasks were and still are to further US industrial agriculture and food science and technology. The science done in such places, and at the Rowett, was that agreed by governments of the day to be most in the national interest.

After the 1939-1945 war, food self- sufficiency remained a national security issue. By 1948 Joseph Stalin, effectively the dictator of the USSR, had strengthened the Soviet Union, with its Eastern European satellite states including Poland, Hungary, East Germany, Czechoslovakia and Romania and Bulgaria, and had a huge army, air force and navy. The official analysis of the challenges for the UK post-war was that the threat of encirclement by German submarines had been replaced by the threat from the USSR. The Soviets were expanding their submarine fleets and aircraft patrols over the North Sea and around the British Isles, and this gave them a real opportunity, should they decide, to block food supplies from the British Empire and Commonwealth. Home food production was and remained a crucial political priority in this Cold War period.

Thus the Rowett became the national powerhouse of research in animal nutrition. The best science was devoted to working out how to make cattle, sheep, pigs and later chickens grow faster and faster, and how to make cows produce the maximum amount of milk.

David Cuthbertson recruited a whole new range of biochemists, chemists, body composition experts, microbiologists and nutritionists. Staff numbers rapidly increased. Basic as well as strategic and applied science research was done. There was no shortage of distinguished top class scientists. Richard Synge of the Rowett won a Nobel Prize for discovering partition chromatography. John Macleod, who shared with Frederick Banting the 1923 Nobel Prize for discovering the therapeutic qualities of insulin, had also later worked with Boyd Orr at the Rowett.

Tom Preston was one of David Cuthbertson's outstanding appointments. He decided to try feeding grains (cereals) to cattle, and rapidly discovered their extraordinary growth-boosting effects, and the equally astonishing increase in milk production. This was why feeding cattle with grains became the national, international and global norm, on all big farms. Agricultural priorities worldwide were transformed. The vast feedlots in which hundreds of millions of cattle are reared in the US, and the current 60-70 per cent of the world's grain crop now fed to animals, is thus an outcome of work done in Scotland designed to protect the food security of an island nation.

Kenneth Blaxter. Appliance of science

Kenneth Blaxter was Rowett Director from 1975 to 1982. He came to the Rowett already a distinguished agricultural scientist specialising in the energetics of animal feeding. At the Hannah Dairy Research Institute in Ayr, also in Scotland, he had developed new approaches to the analysis of the energy needs of animals with the use of multiple whole-body calorimetry chambers.

He was a rigorous scientist who expected rigour in colleagues. He considered most of human nutrition research then being conducted as half- baked and lacking credibility. He was also a combative leader who sought to establish his way of seeing things as the pre-eminent approach to nutrition. His core belief was that global malnutrition would really be solved as soon as agricultural improvements were developed and applied worldwide.

At the Rowett he recruited more outstanding scientists to lead the programmes for cattle (Robert Ørskov), sheep (John Robinson) and pigs (Vernon Fowler and Malcolm Fuller). Arthur Jones, later my deputy before he took up the very prestigious post of Principal of what is now the Royal Agricultural University in Cirencester, England, was in overall charge of the huge animal production department.

Kenneth Blaxter emphasised the vital importance for human survival of applying science to improve farmers' productivity and income. At the Rowett he soon realised that chicken production could be revolutionised. He also believed that deer might be domesticated, and established a deer farm at the Rowett. He is thought to have been responsible for this completely new initiative which has developed starting in New Zealand.

His recruitment of the incomparable Bob Ørskov to work with Tom Preston, by then a world-renowned leader, was just as well, because Tom Preston – as he told me – was not prepared to tolerate constant instruction from his Director, and so took off from the Rowett to work all over the world improving the animal rearing practices of small and family farmers in Latin America, Africa and Asia. He saw this as not only helping the poorest farmers to become self-sufficient and escape poverty but also as a way to improve their own nutrition.

Meanwhile Bob Ørskov continued his own highly original research under the wing of that resilient former Suez Canal paratrooper Arthur Jones, and was soon exploring how to meet the protein needs of fast-growing animals as well as to improve their energy supply.

By the time I arrived in 1982, Bob was doing the most complex ruminant infusion studies in both cattle and sheep to optimise amino acid input while coping with microbial degradation of protein and carbohydrate in the rumen. This led to a discovery which he tells me the Rowett should have patented. This is that animal growth and milk production increase further if the processing of the grains they are fed is minimised, and while the supply of amino acids is improved by the addition of minimally processed fish-meal to forages. This largely escapes digestion by ruminant bacteria but is still available for the animal.

So now there was modern scientific evidence to justify the ancient observations that all animals including ruminants readily tolerate cooked fish-meal (2). Although fish-meal was then introduced for ruminant use, the competition for its more efficient use in poultry, pig and aquaculture feeding means that little is now diverted into cattle and sheep feeding. Global fish stocks are also now under tremendous pressure.

The threat to global food and nutrition

Fluctuations of agricultural supply and demand caused by increases in population, the weather and other factors, can be and are modified by the manipulation of mechanisms of trade, price and availability. Kenneth Blaxter was well aware of this. But he became pessimistic. In a modern version of the gloomy view of the 18th century economist Thomas Malthus, he concluded that industrial agriculture as it had developed by the 1960s was unsustainable, because the huge increases in production, which he and other modern agricultural scientists – including Tom Preston and other colleagues at the Rowett – had enabled, depends on vastly increased use of fossil fuel, for fertiliser and biocides, and for sowing, weeding, harvesting, drying and transporting most of the priority crops.

In our conversations, he gave me graphic examples of this. He became deeply concerned about the issue that has preoccupied rulers and planners down the ages, which is: how can human food supplies be maintained indefinitely?

Now though the issue are far more worrying than they were in times gone by. Now they are ones of nutrition as well as food as a source of dietary energy, and we know now that the Earth's climate is changing, the oceans as a source of food are threatened, and sources of non-renewable energy and of water are dwindling.

Kenneth Blaxter, by then Sir Kenneth, published his views and his warnings in specialist journals (3,4) in book form,(5) and were also published by the Royal Society (6), of which like John Boyd Orr he was a Fellow. But he was ignored. By this stage agriculture had become a gigantic technology-driven corporate business not just in Europe but in the US, the Soviet Union, and increasingly in Latin America. An impressive and thoughtful appreciation of his life's work co-written by the

distinguished nutrition scientist John Waterlow was published by the Royal Society (7) *and is available here.*

Kenneth Blaxter was not a convivial person other than with a few close colleagues. This may have contributed to the neglect of his prescient warnings, which are even more relevant now than then. Soon after my arrival as his successor in 1982, I asked the exceptionally benevolent David Cuthbertson together with Boyd Orr's son-in-law David Lubbock to dinner at Wardenhill, the director's house built in beautiful Aberdeen granite to Boyd Orr's direction. I was surprised how overjoyed they were to come – until they mentioned that the last time they had been in the house was 17 years previously in 1965 when David was director!

Science and social responsibility

I have learned a great deal from studying and contemplating the work of the Rowett Research Institute and its directors and its other scientists before my time there. Sometimes a 'pure science' advance can gain Nobel Prize status, as with Richard Synge. Sometimes this type of science is inevitably over-ridden by compelling national political and economic requirements, as in the 1939-45 wartime period and then the Cold War period, which was still a preoccupation when I took over as Director. Sometimes government ideology may influence and even dominate science. Kenneth Blaxter discovered this in a big way in his last three years as Director in the early 1980s, as the then new prime minister Margaret Thatcher and her fellow 'free market' colleagues and advisors began to drive through the privatisation of science and research.

Science has a duty to work in the public interest. I believed this 30 years ago and I believe it now. I arrived at the Rowett in interesting times, during the first administration of Margaret Thatcher, who as we all know now, was focused on the private interest as the best way to improve industrial efficiency. But I maintain, as with John Boyd Orr with his Nobel Peace Prize, that an abiding responsibility with all sciences that have practical application, is to work towards the improvement of the human, living and physical world, and also – as we have now learned to say in our troubled times – the biosphere. More on this later.

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Status

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