Land-Rover and its Agricultural Applications led to the Agrover and the Trantor tractor.
By Graham A.B. Edwards, co-founder Trantor tractors.

Land-Rover: The farm machine.
When Land Rovers first saw the light of day at the Amsterdam Show 4th April 1948, they were touted ultimately as a revolutionary new concept in farming. The independent Rover Company's design brief said as much, describing its new vehicle as 'similar to a Willys Jeep.... (but) even more useful to the farmer; a proper farm machine…much more versatile... a power source....., able to drive things.....(with) power take-offs everywhere....., and all sorts of bolt-on accessories, to be used instead of a tractor at times.....to be able to do everything!" This concept aimed toward being the world's most versatile machine but, these days, it is the Trantor tractor that is much more versatile.

Central Driving Position.
The history of these early Land-Rover products, is well-covered in Ken and Julie Slavin's 4th edition of their book, published by GR Foulis, Haynes. More recently, Mike Gould's Land-Rover Scrapbook (Porter Press) helped outsiders to Land-Rover Ltd. to know lots more about why decisions were made in the business sphere and perhaps too, what really happened to the centre-steer prototype (shown below). Early Land-Rover reviews echoed Land-Rover's design brief, and in particular the intention that it be used as a farmer's work and transport vehicle. Autocar magazine reported in 1948, that "Land Rover is a mobile power station, which will tow or do a variety of useful work on the land over rough ground. It can drive a large circular saw and cut up timber for firewood. It can be used with trailers to transport loads over ploughed fields or other hard going terrain. As a mobile power-source it takes the power to the job and, with the power-take- off, it can be harnessed to drive a threshing machine, an elevator or a chaff-cutter, draw a plough, and most other farm implements."

The Motor Magazine agreed: 'There is no doubt that, in its design, the Land-Rover Company has applied a wide knowledge and experience not only of vehicle manufacture but of agricultural and industrial requirements'. Additionally, they repeated Land-Rover's primary claims that this new vehicle was 'a portable source of power, and an alternative to the light tractor. Most of this was later realised to lack both realism and common sense!

Suspension makes a difference
In light of Land-Rover's initial intentions, it is surprising to note the vast number of ways in which its 'farming companion' of yesteryear differs to the light tractors used today on livestock and dairy farms, in the UK and abroad. For example, whereas those Land-Rovers had three seats, four-wheel drive, suspension and some bodywork capable of carrying 10 cwt in an area of about 14.5 x 34 inches, light tractors nowadays have one seat, are two-wheel drive, have no suspension and no bodywork for carrying weight, but they do have a three-point linkage for carrying purposes and a one – or two – speed power-take-off. Early Land-Rovers could pull a trailer of about two tonnes at 40mph, which is much faster than that currently hauled by most light tractors.

Most of the farm tractors and Land-Rovers used on British farms today are very different to that envisaged by Land-Rover Ltd., in their original design brief as the prototype, below illustrates.

The Central Drive Land Rover

Farmer-Focused Thinking at Land-Rover Ltd.
The history of farmer-focused product development at Land-Rover Ltd., contrasts markedly with farm tractor design and development. Land-Rovers were evaluated by Britain's tractor testing station, the National Institute of Agricultural Engineering (N.I.A.E) at Silsoe. A comprehensive report was written in 1949 which, rather foolishly (we found later) extolled the virtues of No.32 and No.33 Land- Rovers. Unlike the 1947 prototype, they did not have a central driving position but NIAE ploughed, harrowed, rolled, and reaped and also hauled a power-take-off driven muck-spreader with them. Most 'amazingly' of all NIAE reported approvingly of the Land-Rover's ploughing and power take off performance. 'Amazingly' because the evidence of over 60 years shows that the three point linkage and the power-take-off have rarely been used by farmers – anywhere in the world!

The Land-Rover accentuates very light passenger-carrying facilities in farming, cross-country & cross-desert conditions. These 'farm vehicles' are rarely seen pulling a trailer, but when they pull trailers the size is usually large enough for one horse to be hauled at about 40mph. Farm tractors, on the other hand, are frequently seen hauling much larger trailers (sometimes in excess of 10 tonnes of goods but slowly!) at a maximum legal speed of 20mph. Land-Rover models of today do not have any pretensions to be farm tractors and they do not have a three point linkage, available nor a power-take-off.

These days, all tractors have strong towing drawbars and three point linkages, and also have power-take-offs, at 540rpm and 1000rpm. Land-Rovers and their competitors have front and rear suspension and also have a four-wheel drive system. Few tractors have suspension on front or rear axles, and most tractors in the UK were two-wheel drive until 1970. From 1971, almost all tractors were built with a ROPS safety cabin to protect the driver, in case the tractor should overturn and 4WDrive has dominated the market for four decades.

Off-road users overseas
Land Rovers are very popular in Africa, but in India they are rare, with jeeps (from M&M) being preferred. The developments in people-carrying capabilities have caused the Jeep to face competition from the SUMO, the MARUTI (Suzuki) Gypsy and others. Town to Town 'people carriers' have become important in India, while the absence of standard four-wheel drive, except on the Gypsy, indicates that off-road driving (over fields, tracks, rough ground and cross country in the wet) is considered relatively unimportant. Of course, military jeeps and Land-Rover Defenders must be designed to operate off-road, and therefore they need four-wheel drive. Farm tractors also operate off-road, of course, ploughing, harrowing, drilling, spreading, spraying and crop harvesting. Because of the importance of ploughing, conventional (Ploughing-First) tractors have grown in size and power, and now over 90% of tractors sold in UK have four-wheel drive and the average HP. Is around 150. The weight of these UK tractors is about five to eleven tonnes and all have safety cabins. There is usually one seat in the middle and generally no suspension, which means that multi-furrow, mouldboard ploughs can be used. These tractors have become vastly more sophisticated in order to conduct more output per man, which would appear logical as Britain's farms have progressively been brought within large and combined management groupings. The reason why jeeps have been developed in the direction of Land-Rovers, and why Land-Rovers have been developed towards Freelander or in the Range-Rover direction has absolutely nothing whatsoever to do with farmers or their productivity. The emergence of a more status conscious, middle class whose vehicle is the prime indicator of their class, their success and their image is much more important these days!

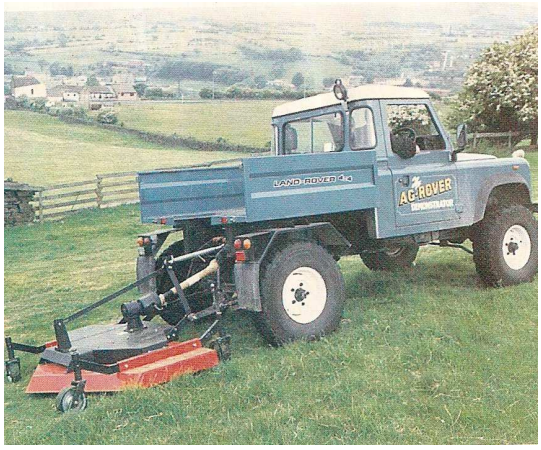
Farmers Needs.
In 1972, the first statistical study of vehicles and tractors on British farms was presented at UMIST (Manchester University) as an MSc. thesis by Stuart Taylor. Taylor highlighted the importance of transport on British farms - largely tractors and Land-Rovers at that time - in achieving high productivity. Stuart, of course, looked at large British farms which, by the standards of some countries, are still quite small. Looking at British farms in the early seventies there were many Series 1,11 and 11A Land Rovers working alongside, and in support of, farm management systems – such as the various kinds of ploughing tractors, then, but no longer manufactured in U.K. by Massey Ferguson and Ford, but also plenty from David Brown, County, Leyland and Case-IH.

While the tractors were powerful enough for their work, users of Land-Rovers regularly criticised their poor engine power. By 1985, however, things had begun to change. Farmers started to buy the 90" and 110" Land-Rovers, with much improved diesel engines (for about £10,000 at the time) which eventually became the Defender Range. The early Land-Rovers frequently had to be modified by farmers to improve the power and efficiency of their diesel engines and as a consequence, became unpopular in farming. The new Land-Rover, however, reversed this sales trend and farmers began to consider them again, for light work with trailers and horseboxes.

Land-Rovers have always been present to support tractors on farms and they could, of course, take over some of the lighter and potentially faster power-take-off and linkage work, if these features were now available.

The Agrover is born.
Realising this to be a fact and spotting a potential market, two Lancashire-based U.K. entrepreneurs, found the then new 90 and 110 models to be much worthier expressions, of earlier Land-Rover design thinking than anything from inside Land-Rover Ltd., and its Special Products Divsion. They decided to design their own version of the Land-Rover for municipal authorities using tractors for light work. It had a powerful power-take-off with accompanying independent clutch and a category 1, three point linkage (to control the mower etc.) along with higher clearance axles and demountable body. Customers could have their Land-Rover, but also have a useful vehicle for some light power-take-off p.t.o. and linkage work. They called their vehicle the Agrover and the photographs (below) show some of its features.

This first Agrover began from the receipt of a complete 110 Land Rover and modifications were made with the addition and 'throwaway' of parts. Since Land-Rover were not in this market segment, they were approached to evaluate the idea and the detail, with the suggestion to throw less away. It was Stephen J. Castellani, (the particularly competent design engineer, who designed and developed Agrover) who wished to submit his designs and detailed engineered adjustments to Land-Rover, for their scrutiny and approval by the then Special Products Division. The Division had wide experience, a closed mind, was staffed by a constraining mediocrity which demanded that it "consecrate and sanctify" that which would weld to its own nuts and bolts.



The Agrover died for lack of market understanding and support from those in the Land-Rover Special Products Division in U.K.

This was the 1980s – and well before TATA!

The TRANsport-first farm tracTOR
Taylor's statistics had a profound effect, however, on his own psyche, and by 1973 he had created a vehicle with a Perkins diesel engine which he called a "TRANTOR". (photographs below). Taylor's Land-Rover experience came from being a member of a Land-Rover trip across the deserts of Morocco, when he was a Perkins apprentice.

In a farming context, early Land-Rover's were 4x4 pick-up trucks which had slow tractors on one side and motor cars on the other. As Land-Rovers became more sophisticated, as passenger vehicles, Range-Rovers became the ever more luxury side of passenger carrying. Product designs moved upmarket in the passenger-carrying and comfort direction. On the other side, the work and transport of people and goods activities of the Land-Rover pick-up are bounded, at their extremity, by farm tractors which conduct a lot of work and transport equipment on trailer, in sprayers, on the linkage, but do not carry passengers. After testing the Trantor tractor in Britain, Nigeria, South Africa and Zambia, Taylor's first production tractor cum vehicle was the Series One Trantor tractor (80hp), with Category 2, three point linkage and 35 HP at the non-live power take-off. It weighed 2.75 tons, had UNIMOG-sized rear wheels (24)" and Land-Rover-sized, smaller front wheels, and was aimed, like Agrover, to come between Land-Rovers and tractors. It was aimed at carrying people and goods (like Land-Rover but not tractors), and also conduct most, but not all, of the work of both.

Greater capability in farming

The statistics Taylor collected showed, as did the early Land-Rover thinking, that a vehicle-like tractor appeared to be required by farmers, and so he and his colleagues in the U.K-based Trantor tractor design team, built and sold about 20 prototypes to customer-focused evaluations overseas and about 125 Series One Trantor tractors for evaluation and use in U.K. They were all focused towards widening the use of Land-Rovers in the direction of conventional farm tractors. Taylor recognised that there were large numbers of tractors used "only on roads" in U.K. by Water Boards and County Councils. Taylor probably underestimated the significance, to farmer buyers, of anything really new in concept. On reflection, his team over-estimated the importance, to farmers, of transportation, low-draught work tasks, braking on all wheels, balanced braking to farm trailers, - and suspension on the linkage. All of these were adequately embraced within his designs in the 1980's. There was, additionally, an under-estimation of the importance of power-steering, the need for high p.t.o performance as well as the essential independent clutch facility and strong lifting capability of the 3 point-linkage.

What customers did, and do appreciate in the Series One TRANTOR tractor design was that it conducted all the usual duties of a Land-Rover, towed much bigger trailers, had a linkage (which by 1980 had become unavailable on Land Rovers) and had a more useful power-take-off than that of Land-Rover. While the bigger rear wheels of the two-wheel drive Trantor tractor appeared to give the product sufficient traction in wet fields, the absence of four-wheel drive on these early Trantor tractors certainly caused some buyer resistance.

By 1985, however, Taylor had learnt some lessons, from his TRANTOR customers and from his team of marketing researchers, who studied why some important, interested farming customers had not bought the Series One Trantor tractors. A 96 H.P. diesel-powered, 2 Wheel Drive Series Two TRANTOR tractor was thus introduced with independent power take-off, (giving about 75 H.P. at the power take-off to operate farm machinery or spreading, spraying and mowing equipment) and a Category 2., three point linkage. It weighed about 3.5 tonnes. Farmers could then buy either the conventional Land-Rover, the Land-Rover with adjustments (Agrover) or the Trantor tractor.

The power of the power take-off and the weights to be carried on the linkage, as well as the trailer load to be hauled, could be assessed, and any one of the three different vehicles (developed from original but discarded Land-Rover thinking) could be selected by farmers. The oft-expressed farmers' need for more power was, at last, satisfied by the 128 H.P. Trantor tractor, a transport-first farm tractor, used by Tesco's Holbeach potato co-operative for 18 years of practical, user-focused

development. Stuart Taylor's Series 2 Trantor tractor was functional rather than pretty, & became available just as Land-Rover set about rebuilding their Image with the model which eventually became known as the Defender.

A Very Powerful Land Rover

The weight of the Land Rover was about two tonnes and the 128 H.P. Trantor tractor was about 3.5 tons. In 1985, The retail price of a Land-Rover 110 Defender was about £10,000, the Trantor about £20,000 for the 128 H.P. model and the Agrover about £15,000. The Land-Rover always had an inappropriate power take-off and 3-point linkage for any substantial work in farming but, as power take-off equipment for tractors became popular in the seventies, the presence of an independent clutch was progressively more important. The Agrover of 1985 gave customers this important facility on a conventional Land-Rover, along with a 3-point linkage! Whereas the Agrover had 45 H.P. at the power take-off and a category 1 linkage, the Trantor had 75 H.P at the p.t.o and a category 2 linkage.

The trailer pulling ability of the Land-Rover was not increased by the Agrover specification, while the Trantor tractor increased the haulage capacity from three to four tonnes to in excess of 10 tonnes at 40 m.p.h. on the road. This increase in load-weight was very important to those in the farming industry who chose to use the Trantor tractors because the work profile of many farmers (moving bales, fertiliser and goods) demanded that big trailers be used. While its fair to say that all the above features are clearly important to farmer users, so is ground clearance. The Agrover and Trantor tractor had similar ground clearance but the Land-Rover less. Part of the Agrovers specification, which was even less appreciated by (Land Rover's Special Products Division), than the three point linkage and power take-off, were the high clearance axles. Agrover's designer created more ground clearance in order to help farmers and local authority customers achieve their in-field objectives. Land-Rover Special Products Division were uninterested!

Similarities and Differences

The Trantor tractor was different to the Agrover, however, because it was specifically designed to be a transport-first tractor, in contrast to all other tractors which put ploughing-first. Transport duties of Land-Rovers have veered more towards passenger-carrying in the cabin and carrying up to two horses, or the like, on the trailers. The Agrover follows this but adds a small linkage and smallish power take-off, but the same haulage capacity as the Land-Rover. The Trantor tractor is quite different, but still focused partly towards passenger-carrying. It has three proper seats in the cabin, and 4 more on the platform. It is also focused on the size of the trailer to be hauled, the size of agricultural equipment on the linkage and the greater power of the independently clutched power take off. By 1987, Agrover had been withdrawn from the market due to the lack of support from Land-Rover (in which very little was given support, except strikes), and because the design required the standard Land-Rover to be 'adjusted', The Trantor tractor is still very much in business these days and focuses its design and technology towards the transfer of its forward thinking designs towards the new world of Conservation Agriculture where Zero-tillage is being promoted, in a worldwide sense by FAO and in Europe by ECAF.

Conclusion

While British designers are applauded for their clothes, buildings and packaging, some of the finest automotive designers are usually thought to exist at Williams, McLaren, and Ricardo, for example. The Land-Rover has had a profound influence on those who learn and develop their engineering design skills firstly by tinkering with old bangers, then by rebuilding their favourite 'classic', and later by improving particular aspects of selected vehicles. Land-Rover has been an important stimulant to young creative engineers in U.K. While Land-Rover Ltd., has not always been supportive of such ventures, when conducted outside their control, the time may be coming when TATA will set up an Indian-based "Land-Rover Derivative Company" to help India move more quickly in to a wider appreciation of Automotive Design. India has 650 million farmers and their interests could become important to TATA?

This is an updated and abridged version of that published in Land Rover World. See also, Keynote address "The Eco-design & Development of Farmers Working Vehicles and their Tractors – History and Innovation", ARAI-SIAT Conference, January 2009.