

Proceedings of The Institute of Acoustics

NOISE PROBLEMS IN THE AGRICULTURAL INDUSTRY

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INTRODUCTION

The agricultural industry in the United Kingdom is one of considerable diversity with 148,000 holdings with an area greater than 20 hectares (50 acres) and some 15,000 holdings larger than 100 ha. These farms employ 364,000 full time workers and a further 329,000 part time and casuals.

Fifty three percent of farmers employ only one full time worker, 23% employ two workers and a further 10% employ 3 workers. The rate of change of machinery and methods is generally slow. This can be illustrated by the 1986 census returns for wheeled tractors which shows 474,000 tractors of greater than 25 kW (34 hp) with a current replacement rate of well under 20,000 machines a year.

Every farm is different, has different buildings, different makes of fixed plant and different combinations of machines in use. This presents a considerable challenge to Agricultural Development and Advisory Service advisors and to Health and Safety Inspectors alike in trying to provide generalised advice to what are usually specific noise control problems.

This diversity also creates problems in studying noise in the industry and in effectively sampling particular types of noise situation. Surveys and advisory work however show that agriculture suffers many of the same problems as other industries with both worker hazard and environmental noise pollution.

WORKER HAZARDS

With the introduction of noise control legislation in 1976⁽¹⁾ tractor noise has been gradually reduced by the development of improved quiet cabs. Typical maximum noise test levels today range between 82 to 85 dB(A). Tractor cabs however are only fully effective with closed windows and doors whilst surveys have shown this condition to prevail for less than 50% of field operations. The reason for this may either be for ventilation purposes since few tractors have air conditioning or to allow access to the controls of mounted or trailed machinery. Machines such as forage harvesters can add over 90 dB(A) to the noise already present at the driver position.

Recent dosimeter surveys carried out on behalf of the Health and Safety Executive in anticipation of impending EEC legislation⁽²⁾ show many tractor drivers are exposed to noise levels well in excess of 90 dB(A). Self-propelled machines such as combine harvesters, forage harvesters and sugar beet harvesters also create noise in excess of the new guidance criteria.

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The hazard to drivers is compounded by the long shifts worked in the summer months which are typically 12 hours rising to 16 hours at harvest peaks. Some examples of daily personal noise exposure levels $L_{EP,d}$, (L_{eq} (8 h)) are given in Table 1.

Table 1. Range of exposure levels for typical farm tasks ($L_{EP,d}$)

Ploughing (wheeled tractors)	85-91
Cultivating (crawler tractors)	88-106
Combine harvesters	82-94
Forage harvesters	80-93
Sugar beet harvesters	84-99
Grain drier operative	85-97
Milling and mixing plant	74-101

Estimates of the number of working days required for the major farm tasks have been made and estimates of the levels of noise exposure have been combined with these to produce total man days exposure. This data is shown in Fig. 1 both in terms of total man days per annum and as a percentage of the days worked by the total full time work force (91,000,000 man days). Superimposed is the estimate of the percentage of the number of industrial workers exposed to noise made in the Health and Safety Commission's Consultative Document on Noise(3).

ENVIRONMENTAL NOISE POLLUTION

Community annoyance reaction to agricultural noise sources has been growing steadily during the last 20 years. It is mostly associated with disturbance to sleep caused by grain and crop driers. In studies of the circumstances of noise annoyance we have used the industrial noise annoyance criteria of BS4142(4) to assess the likelihood of complaint. We have found that provided account is taken of the very low background noise levels which exist in rural areas the difference criteria used give a realistic indication of the likelihood of complaints.

Although levels are low with respect to most industrial noise sources drier noise which is usually from fan sources has tonal characteristics which can propagate over considerable distances, Fig. 2.

Good siting, careful attention to operating times and a good public relations policy are the most economic form of treatment for this type of plant which is generally used for only 3-4 weeks per year.

REFERENCES

1. Agricultural (Tractor Cabs) Regulations 1974 (SI 1974 No. 2034)
2. EEC. Proposal for a Council directive on protection of workers from the risks related to exposure to agents at work. Noise Draft EEC Doc. No. 5155/81
3. Health and Safety Commission. Consultative Document 1981. HMSO
4. BS4142:1967 Method of Rating Industrial Noise Affecting Mixed Residential and Industrial Areas.

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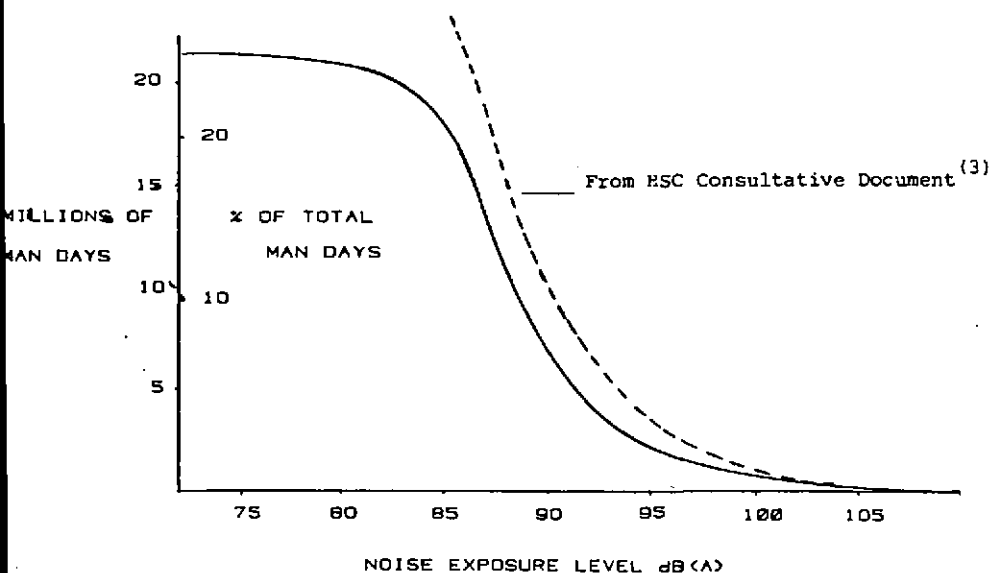


Fig. 1 Noise exposure levels $L_{EP,d}$ for man days worked in agriculture per annum and as a percentage of the total annual man days, with industrial assessment superimposed.

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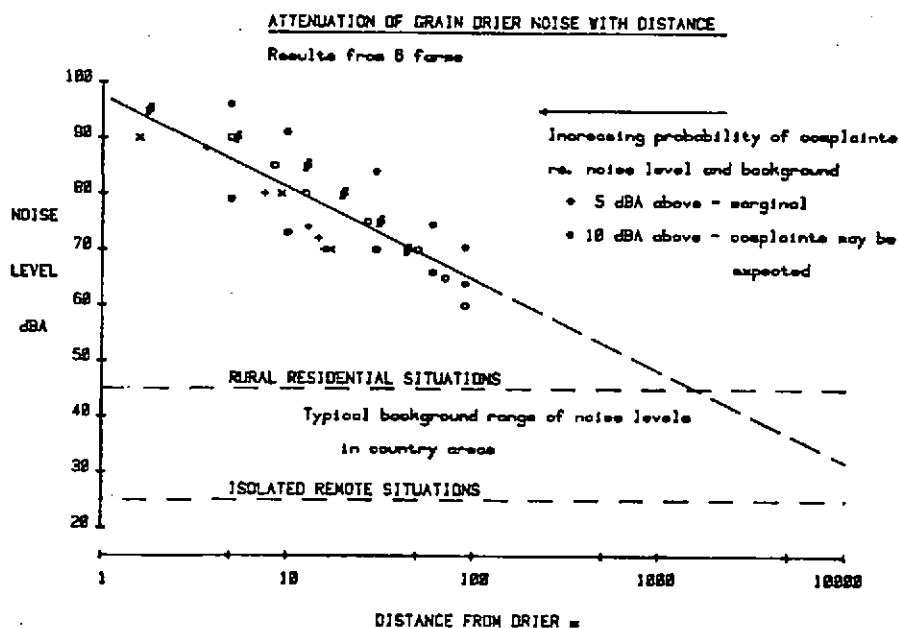


Fig. 2 Attenuation of grain drier noise with distance