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NOISE AND HEARING OF A POPULATION OF FOREST WORKERS.

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An occupational health examination of forest workers (Hansson et al 1967, Kylin et al 1968) has shown that the noise of tractors and power saws used in forestry will be a hazard to the hearing. However, the levels of these noises are very varying and make the evaluation of the degree of hazard doubtful.

The hearing levels and the noise exposure of forest workers were carried out in order to contribute some data to the question of the relation between the hearing loss and the exposure to intermittent noise.

In 1965 and 1968 hearing thresholds were determined for about 1700 and 1000 workers respectively in Nothern Sweden. On both occasions about 900 men were examined. Of these 261 fellers and 59 tractor drivers had no history of earlier damage to the hearing.

A Danavox audiometer was used and the audiometry was carried out in a resting cabin, which was placed in the neighbourhood of the place of work out in the forest. The background noise levels were satisfactory for regular audiometry.

Noise measurements were carried out at the ear on 12 fellers and 5 tractor drivers, who were selected at random at different places of lumbering. Five types of power saws and five types of tractors were represented. The noise measurements comprised several working cycles and octave band analysis was made of the noise on typical parts of different working moments. Also, a statistical distribution analysis of noise levels in dB(A) by time was carried out.

The noise levels at the ear of the fellers and the tractor drivers during the different working moments are shown in tables 1 and 2. Noise levels between 85 and 110 dB(C) were found.

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Table 1. Sound pressure levels, dB(C), of different moments of lumbering with power saws.

Power saw type	Working moments			
	Idling	Felling	Pruning	Cutting
Raket 60	84-95	96-109	97-107	96-108
Homelite XL-660	83-95	101-110	90-106	99-107
Partner R 14	87-90	97-112	87-108	100-109
Husquarna 65	81-95	91-105	92-102	93-104
Mc Culloch 4-10	87-95	107-110	90-105	107

Table 2. Sound pressure levels, dB(C), of different moments of tractor driving.

Tractor type	Working moments			
	Idling	Loading	Driving	Unloading
SMV Drivax	113-114	112	103-113	106
Hemek	110-112	98-99	108-110	-
VMV Stalo C	110-113	98-111	99	107-109
Nalle SM 660	106	101	108	100
Timberjack 230	114-115	114	110-111	-

The octave band analysis showed that the noise of the power saws was a rather flat noise with the energy maximum in the 1000 Hz octave band . The noise of the tractors, on the other hand, had a low frequency character. Both noises exceeded the limits for tolerable noise exposure established by Swedish authorities. However, these limits are valid only for a steady state noise.

In the latest I.S.O. draft proposal for assessment of occupational noise exposure a method is given in which the sound levels in dB(A) and durations of a varying noise can be transformed into a continuous noise level considered to be equally hazardous to hearing. According to this method the noise exposures of the fellers and the tractor drivers (figures 1 and 2) during a normal working week (assumed to be 40 hours) could be transformed into continuous noise levels of 95,3 dB(A) (range 90-99) and 97,8 dB(A) (range 92-105) respectively.

At the examination in 1965 the fellers had been using power saws on an average of about 10 years and the drivers a tractor during about 8 years. Age distribution and exposure times are shown in table 3.

Table 3. Age distribution and exposure time among forest workers at the examination in 1965.

	Number of persons	Exposure time years	Age in years Quartiles Q_3	Q_2	Q_1	mean
Fellers	20	0-2	41	46	53	46
	30	3-5	33	42	51	41
	28	6-8	25	41	47	38
	97	9-11	36	40	48	40
	86	12-	38	41	45	41
Tractor-drivers	59	1-12	29	38	46	38

The average group audiograms of the fellers and the tractor drivers showed the typical pattern of noise induced permanent threshold shifts (figures 3 and 4). The hearing loss was rather moderate, furthermore there was no considerable difference between the results of the two examinations in 1965 and 1968.

A comparison between these results and those of an earlier investigation on the hearing levels of a population exposed for about 12 years to steady-state occupational noise (Kylin 1960) shows that the hearing levels of the fellers and the tractor drivers did correspond to the hearing of the group which was exposed to a continuous sound level of about 90 dB(A). Thus, the method used to transform an intermittent noise with varying noise levels into an equally continuous noise level seems to give too high a degree of risk.

References:

Hansson, J-E., Kylin, B. and Gustavsson, B.: Skogstraktorn som arbetsplats. Royal College of Forestry, Research Note no. 32, 1967, Stockholm, Sweden.

Kylin, B., Gerhardsson, G., Hansson, J-E., Lidström, I-M Liljenberg, B., Swensson, Å. and Åstrand, I.: Hälso- och miljöundersökning bland skogshuggare. National Institute of Occupational Health, Research Note no. 5, Stockholm, Sweden.

Kylin, B.: Temporary Threshold Shift and Auditory Trauma Following Exposure to Steady-State Noise. Acta Oto-Laryngologica, suppl. 152, 1960.

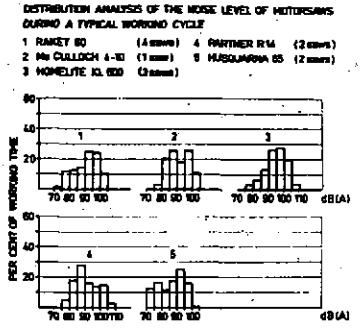

Figure 1.

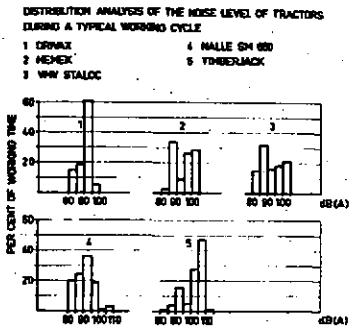

Figure 2.

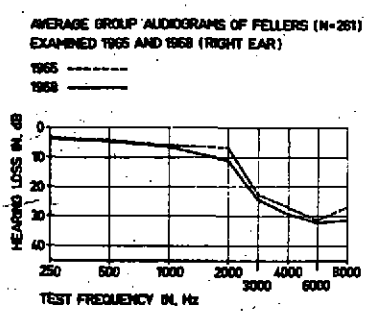

Figure 3.

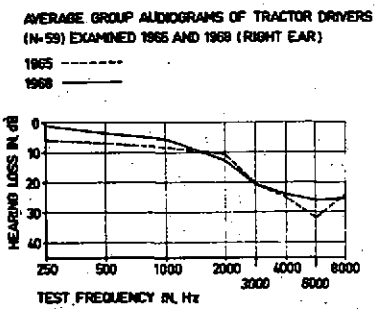

Figure 4.