



## A SURVEY OF AGRICULTURAL TRACTOR OPERATORS' BACKGROUND AT EJURA, GHANA

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### Abstract

Tractors are costly machines and hence it is important that they are operated by well-trained operators. A survey of 61 agricultural tractor operators at Ejura, Ghana was conducted to identify their personal profile, and to assess their background training in tractor operation and maintenance. The mean age of the tractor operators was 35 with a standard deviation of 9 years. About 47.5% of the tractor operators were illiterate while 37.7% had between one and six years of primary school education. About 36.1% of the tractor operators had no valid driving licence while 31.1% had the agricultural and road construction equipment licence. The remaining 32.8% of the tractor operators had vehicle driving licences of various grades. The responses to the survey show that 96.7% of the tractor operators learnt how to operate the tractor from other tractor operators rather than from a formal tractor operation training school. Survey responses indicate that 78.7% of the operators do not have access to the tractor operator's manual, or keep records of tractor operation, maintenance and repairs. Additionally, the results show that 67.2% of the operators did not know their tractor rear tyre inflation pressures. Furthermore, 96.7% of the operators did not follow tractor manufacturer's recommendations in the maintenance and repair of their tractors. Survey results also indicate that all the tractor operators who participated in this study can correctly identify the appropriate soil condition before ploughing. The study draws attention to seriously consider providing quality training to tractor operators at Ejura.

**Keywords:** Tractor, Tractor Operator, Background, Survey, Ejura, Ghana.

### Introduction

Tractors play an important role in agriculture in some communities in Ghana. Some communities in Ghana where tractors are used in agriculture include Tamale, Nyankpala, Atebubu, Wenchi, Nkoranza, Techiman, Afram Plains and Ejura. Ejura is the capital of Ejura-Sekyedumase district in the Ashanti Region of Ghana. The labour force engaged in agriculture at Ejura is about 68.2% of the work force (Ejura-Sekyedumase District Assembly, 2006) which is above the national average of 50.7%. Some major problems associated with operating tractors at the smallholder level include maintenance facilities, repairs, spare parts and operator skills (Crossley and Kilgour, (1983). The use of cost effective tractors would not be possible at Ejura without the availability of well-trained operators.

An agricultural tractor is a traction machine, intended primarily for off-road usage, designed and advertised primarily to supply power to agricultural implements (ASABE Standards, 2011). Tractors are very costly machines and hence it is important that they are operated by well-trained operators. Tractor operation with different machines or implements requires special knowledge, skills and training (Bhutta *et al.*, 1997). It is important that tractors at Ejura are operated by well-trained operators. Having the requisite background is a key to efficient and effective tractor operation. Therefore, there was the need to assess the background of tractor operators at Ejura. Results from the study could be used for making policy decisions on tractor operator training. The objectives of study were to identify the personal profile of Ejura tractor operators, and to assess their background training in tractor operation and maintenance.

### Materials and Methods

#### Study Area

A survey was carried out at Ejura in the Ejura-Sekyedumasi District of the Ashanti Region of Ghana. Ejura-Sekyedumase lies within the transitional zone of the semi-deciduous forest and Guinea Savannah zones. Thus, it experiences both the forest and savannah climatic conditions. The district is marked by two rainfall patterns; the bi-modal pattern in the south and the uni-modal in the north. The main rainy season is between April and November. The north-east trade winds blow dry and dusty winds across the entire district during this period. Annual rainfall varies between 1,200 mm and 1,500 mm (Ejura-Sekyedumase District Assembly, 2006). Ejura is located in the northern part of the Ashanti Region. It is bounded in the north by Nkoranza and Atebubu Districts, in the Brong Ahafo Region, East by the Sekyer East District, South by the Afigya-Sekyer and Sekyer West District and West by Offinso District. Ejura was chosen for the study because it is important for crop production and has the largest number of tractors in the Ashanti

Region of Ghana. Ejura is also the largest maize producing district in the Ashanti Region of Ghana. The landscape of Ejura is almost flat and that makes it very conducive for mechanised farming.

### Data Collection and Analysis

The survey instrument used was a questionnaire. The questionnaire was developed based on the personal profile of the tractor operators, and their background training in tractor operation and maintenance. The questionnaire was administered between April and May 2008 to 61 tractor operators at Ejura. The data obtained from the survey was summarized using descriptive statistics and described using tables and bar graphs. The MINITAB Statistical Software Release 15 (MINITAB Inc. 2007) was used to analyse the data.

## Results and Discussion

### Profile of Tractor Operators

All the 61 tractors operators who participated in the study were male. There were no female tractor operators. Table 1 summarizes the age group distribution of the tractor operators. The mean age of the tractor operators was 35 years with a standard deviation of 9. It can be seen that 93.5% of the tractor operators were between the ages of 20 and 49 years. This indicates that the agricultural tractor operation at Ejura is undertaken by young people. The modal age group was the 30–39 age group. Only 6.5% of the operators were 50 years or above.

Table 1: Age Group of Tractor Operators

Age Group (Years)	Frequency	%
20–29	18	29.5
30–39	25	41.0
40–49	14	23.0
50–59	4	6.5
Total	61	100

Fig. 1 illustrates the educational level of the tractor operators who participated in the study. Out of the 61 tractor operators, 47.5% had no formal education.

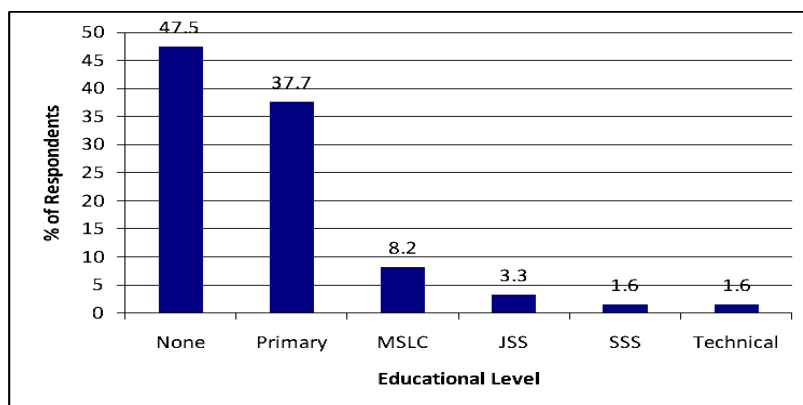


Fig. 1: Educational Level of Tractor Operators

Approximately 37.7% of the tractor operators had between one and six years of basic school primary education while about 11.5% of the respondents had middle school leaving certificate (MSLC: 8.2%) or Junior Secondary School (JSS: 3.3%) level education. Only 3.2% of the tractor operators had education above the basic school level [i.e. Senior Secondary School (SSS: 1.6%) or Technical School level (1.6%)]. One of the factors that affect the capabilities of the tractor operators is education. It is important that the tractor operators read and understand all instructions in the operator's manual. The literacy status of the tractor operator will enable him to understand how the tractor and its implements are used in order to use the tractor effectively and prevent unnecessary breakdown.

Table 2 presents the work experience of the tractor operators at Ejura. As shown in Table 2, about 68.9% of the tractor operators had between one and ten years working experience in tractor operation. About 27.8% had between 11 and 20 years working experience while 3.3% of the tractor operators had above 20 years tractor operation working experience.

Table 2: Operating Experience of Tractor Operators

Experience (years)	Frequency	%
1–5	20	32.8
6–10	22	36.1
11–15	11	18.0
16–20	6	9.8
>20	2	3.3
Total	61	100

### Profile of Tractors in Operation

Table 3 provides data about the tractor makes used at Ejura. The most common tractor make used at Ejura was Massey Ferguson. This represented 70.5% of the tractors used at Ejura. About 11.5% of the tractor operators indicated that they use Ford tractors while about 3.3% of the operators used Intentional tractor make. The remaining 14.7% used other makes including Farmtrac (9.8%) and Swaraj (4.9%). Data from the study show that about 93.4% of the tractors in use at Ejura were purchased as “second hand.” Only 6.6% of the tractors were purchased as brand new. About 88.5% of the tractor operators indicated that they operate tractors older than 20 years while 11.5% said that their tractors were aged between one and 20 years.

Table 3: Tractor Make

Tractor Make	Frequency	%
Massey Ferguson	43	70.5
International	7	11.5
Ford	2	3.3
Other (Swaraj; Farmtrac)	9	14.7
Total	61	100

Table 4 summarises the responses of the tractor operators with regards to the working condition of their tractor hour meter and speedometer. It can be seen that 78.7% of the tractor operators did not have their tractor hour meters in working condition. Only 21.3% of the operators had their tractor hour meters in working condition. An hour meter operates whenever the tractor engine is running and shows the total hours of operation. It is important to record the hour meter reading and watch this meter to tell when maintenance services are required (Hathaway and Buckingham, 1980). It is therefore essential that the hour meter is kept in working condition at all times.

Table 4: Working Condition of Tractor Hour meter and Speedometer

Condition	Hour meter		Speedometer	
	Frequency	%	Frequency	%
In working order	13	21.3	14	23
Not in working order	48	78.7	47	77
Total	61	100	61	100

Table 4 also presents the responses of the tractor operators regarding the condition of their tractor speedometer. Out of the 61 tractor operators interviewed, 47 of them representing 77% of the tractor operators did not have their speedometers in working condition. Only 23% (14) of the tractor operators had their tractor speedometers in working condition. The speed at which tractor operation is done plays an important role in influencing soil physical properties and crop production (Aikins *et al.*, 2007). Speed has important effects on the type of work done. Where the soil is in a suitable condition for tilth formation, the higher the speed within normal limits, the greater is the pulverising effect (Aikins *et al.*, 2007; Culpin, 1992; Davies *et al.*, 1993; Taniguchi *et al.*, 1999). Higher speed operations may be more dangerous and require more operator skill. As speed increases, so does the strain and wear on the implement, hence more repair costs and down time (Downs and Hansen, 2004; Zoz, 1974). There is therefore the need to ensure that the tractor speedometer is in working order.

### Tractor Operations and Annual Usage

Fig. 2 illustrates the operational uses of agricultural tractors at Ejura. Tractors at Ejura are used for ploughing and carting (82.4%), ploughing and slashing (11.2%), ploughing and harrowing (1.6%), and carting and shelling (4.8%). Carting includes transportation of farm produce, firewood, sand, cement blocks, water, and other items.

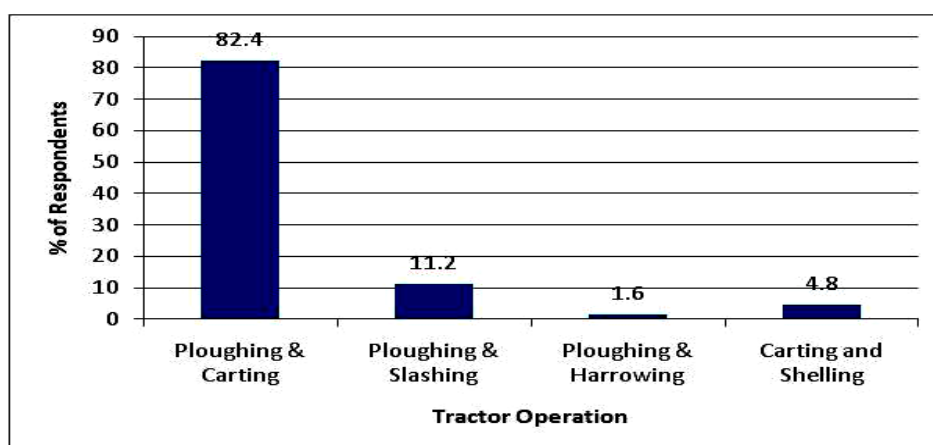


Fig. 2: Tractor Operations

Table 5 shows the annual usage of tractors at Ejura. About 65.6% of the tractor operators indicated that their tractors were used between nine to twelve months in a year while 32.8% said that their tractors are used for four to eight months in a year. Only 1.6% of the tractors were used between one and three months in a year. The results show that tractors at Ejura have high annual usage.

Table 5: Annual Usage of Tractors

Tractor Use in a Year (months)	Frequency	%
1 – 3	1	1.6
4 – 8	20	32.8
9 – 12	40	65.6
Total	61	100

### Type of Licence held by Tractor Operators

Fig. 3 illustrates the type of licence held by the tractor operators at Ejura. About 36.1% of the tractor operators indicated that they did not have any valid tractor operation licence. Approximately 31.1% of the tractor operators reported that they had the “agriculture and road construction” licence while about 16.4% of the operators said that they held the “heavy duty vehicle not exceeding 8000 kg” licence. About 14.8% of the tractor operators said they had licence in the “cars not exceeding 2950 kg” category while 1.6% of the tractor operators reported that they held licence in the “light duty vehicle between 2950–5500 kg” category.

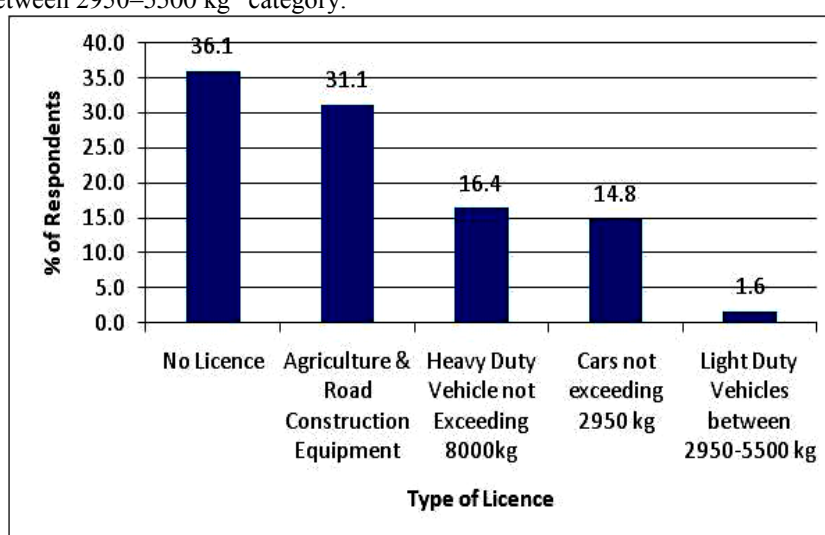


Fig. 3: Type of Licence held by Tractor Operators

### Tractor Operator Training

Table 6 presents the responses of the tractor operators with regards to their training. While 96.7% of the tractor operators indicated that they learnt to operate the tractor from their “master” or through another tractor operator rather than through a formal training operator training school the remaining 3.3% said they attended a tractor operator training school. The tractor operators who reported having attended the tractor training school indicated that they were trained at the Ejura Agricultural College in the Ashanti Region of Ghana.

Table 6: Tractor Operator Training

Tractor operator training	Frequency	%
From another operator	59	96.7
From tractor training school	2	3.3
Total	61	100

### Tractor Operation and Maintenance

Table 7 summarises the responses of the tractor operators’ access and use of their tractor operator’s manual. About 78.7% of the operators indicated that they did not have access to or used their tractor operator’s manual. Only 21.3% of the tractor operators had access to their tractor operator’s manual and used them. Access to the tractor operator’s manual is a key to understanding safe operation, maintenance and repairs of the tractor.

Table 7: Operator’s manual, Maintenance and Repair, and Tractor Operation Records

	Operator’s manual		Tractor operation records		Maintenance and repair records	
	Frequency	%	Frequency	%	Frequency	%
Yes	13	21.3	13	21.3	13	21.3
No	48	78.7	48	78.7	48	78.7
Total	61	100	61	100	61	100

Table 7 also provides the responses of the tractor operators on records keeping on tractor operation, and tractor maintenance and repair. Survey responses show that most (78.7%) of the operators did not keep written records of their tractor daily operations, and maintenance and repairs. Only 21.3% of the operators kept written records of their tractor operation, and tractor maintenance and repair. These results are similar to those found by Wertz *et al.* (1990) who found that 60% of the tractor operators in Lancaster County, Nebraska, USA did not keep a continuous record of service intervals. A good way to be sure that all maintenance is performed on schedule is to keep records. The recommendations in the tractor operator's manual for specific service intervals must be followed (Hathaway and Buckingham, 1980). Poor records keeping of tractor maintenance and repairs makes it difficult to ensure cost effective tractor maintenance and repairs.

Table 8 presents the responses of the tractor operators as to whether they followed the tractor manufacturer's recommendation in the maintenance of their tractors. It can be seen that 96.7% of the tractor operators did not follow the manufacturer's recommendation in the maintenance and repair of their tractors. They depended on local mechanics in the maintenance and repair of their tractors. Only 3.3% of the tractor operators interviewed followed the manufacturer's recommendation in the maintenance of their tractors.

Table 8: Tractor Manufacturer's Recommendation for Maintenance

Manufacturer's recommendation	Frequency	%
Follow	2	3.3
Do not follow	59	96.7
Total	61	100

### Tractor Housing

Table 9 provides the responses of the tractor operators regarding tractor housing. About 98.4% of the tractor operators reported that they leave their tractors in the open at the end of the working day. Only 1.6% of the operators indicated that they house their tractors under a shed. The storage of tractors and implements in the open leave the tractors and their associated implements at the mercy of the weather and thieves. There are no conclusive data to prove the economic value of sheltering farm machines. Nevertheless, providing shelter is often associated with better care and maintenance of machines that can result in longer life, improved appearance, and better resale value (Srivastava *et al.*, 2006).

Table 9: Tractor Housing

Tractor Housing	Frequency	%
In a shed	1	1.6
In the open	60	98.4
Total	61	100

### Tyre Inflation Pressures

Tractor operators were asked if they knew their tractor rear and front tyre inflation pressures. Survey responses indicate that 67.2% of the tractor operators did not know the rear tyre inflation pressure of their tractor while 27.9% did know the rear tyre inflation pressure of their tractors. Survey results also indicate that 63.9% of the tractor operators did not know the front tyre inflation pressure while 27.9% did know the rear tyre inflation pressure of their tractor. Overall, the tractor operators at Ejura have poor knowledge about their tractor tyre inflation pressures. They relied on local vulcanizers to decide the correct tyre inflation pressures for their tractor rear and front tyres. An important consideration to be made when using tractors is the tyre pressure. Traction power transfer to the ground is mainly because of the tyres. Different factors may also affect the traction force including the type, size as well as the number of tyres but it is the inflation pressure that plays a big role in the performance of the tractor. It is, therefore, very helpful to maximize the performance of the tractor by providing proper pressure of the tyre (Agco Allis, 2011).

### Knowledge of Soil Conditions before Ploughing

Survey participants were asked to report on the soil condition before ploughing. All the tractor operators (58 out of 61) who use their tractors for ploughing indicated that they know the appropriate soil condition for seedbed preparation. They would not attempt to till the soil when it was very dry, when the soil was dry or when the soil was too wet. They would only till under moist soil conditions.

### Conclusion

All the 61 tractors operators who participated in the study were male with mean age of 35 and standard deviation of 9 years. The findings illustrate that tractor operators at Ejura have low educational level. About 68.9% of the tractor operators had between one and ten years working experience in tractor operation. The most common make of tractors (70.5%) used by the tractor operators at Ejura was Massey Ferguson. Approximately 36% of the tractor operators did not have any valid tractor operating licence while only 31% of the operators had licence in the "Agriculture and Road Construction" category. The study also show that the majority (96.7%) of the tractor operators learnt to operate the tractor from other tractor operators rather than through a formal training operator training school. The results show that tractors at Ejura have high annual usage. About 78.7% of the tractor operators did not have their tractor hour meters in working condition while about 77% of the tractor operators did not have their speedometers in working condition. The

results of the survey indicate that 78.7% of the operators do not have access to the tractor operator's manual, or keep records of tractor operation, maintenance and repairs. About 98.4% of the tractor operators leave their tractors in the open at the end of the working day. The results show that 67.2% of the operators did not know the tractor rear tyre inflation pressure. Furthermore, 96.7% of the operators did not follow the recommendations of tractor manufacturers in the maintenance and repair of their tractors. Survey results also indicate that all the tractor operators who participated in this study can correctly identify the appropriate soil condition before ploughing. The study draws attention to seriously consider providing quality training to tractor operators at Ejura.

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