

FARMSTOCK

WEST AFRICAN FARMERS' & COOPERATIVES' MONTHLY

JUNE 75

PRICE 35k

AGRICULTURE
IN W.AFRICA

p. 6



GHANA PLANS
INTERNATIONAL
TRADE FAIR

p. 9

SCHOOL FARMS

p. 10

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FARMING BY T.V

p. 23



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A pond of the mechanised complex for duck cramming at the Kirov Collective Farm of the Village of Novominskaya, Krasnodar Territory. USSR.

cover Pix

NEW LIVESTOCK WEIGHER FOR
SMALL ANIMALS

A new mobile livestock weigher, the 'Multiway' designed specifically for small animals, weighing up to 400 lb (180 kg), has been introduced by a British Company and is being exhibited at this year's Royal Show at the National Agricultural Centre at Stoneleigh, Warwickshire, in the English Midlands.

The Multiway has a tubular steel frame sheeted on either side and the weigher is mounted on an advanced suspension system incorporating four join balls at the top and four at the bottom, for accurate weighing. Spring-loaded gates at both ends can be operated from either side. The scales can be turned through 360 degrees for reading from any angle and the operating level can be fitted for working from either side. The wheels operate when the weigher handles are raised.

One of the main themes of the 1974 Royal Show—Britain's premier agricultural exhibition—is Fuel Economy. The number of trade stands is up to 721 from last year's figure of 678 and many countries have extended their international pavilion areas. In the case of Canada and Holland these have been doubled.

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Managing Editor ABIQDUN OJUGBELE

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LETTERS

ROADS TO FARMS

The roads leading to important agricultural sites in various parts of the federation have become so bad that farmers find it very difficult to transport their products to the markets.

It appears that the authorities cannot cope with all the road developments in the country particularly roads leading to farms

Moreover, I am appealing to the government to improve some of these roads before the next rainy season.

CALABAR

PIUS EFFIONG

MANPOWER AND AGRICULTURE

The use of manpower in agriculture is among the main causes of poor agricultural outputs in the country. Superstition also contributes a lot to poor agricultural output as farmers maintain beliefs of irrelevant ideas.

Government should consider granting loans to farmers to buy modern implements. Such implements will reduce their task, do their chores efficiently and quickly so that more produce will come from the farms. Surely life will be easy for all and food will be cheap.

LAGOS

BABA ADE

ESTABLISH TRAINING CENTRES

Illiteracy among farmers is rampant mainly because farmers from time immemorial do not believe in writing, learning or reading. This point made many farmers to remain illiterate today.

To boost agriculture in all aspects, illiteracy needs to be terminated. How can this be done as some farmers are already old enough to forget about learning, reading and writing? To me, I think illiteracy

can be curbed if training centres are built for the training of our good old farmers by agricultural experts throughout the country.

If this is done with an immediate effect, Nigeria by 1978 will be better for it.

OISHOGBO.

AYODELE BALOGUN.

FARMER'S GUIDE

Farmers throughout the country ignore essential points necessary for good results in grain storage.

Many farmers do not clean their store rooms and thereby allowing insect pests to hide all about in their stores. Additionally, they forget to harvest grains promptly when matured to minimise field attacks by plant pests.

I hope Farmstock can help the farmers by providing them with a farmer's guide in its next monthly.

ONITSHA

ERNEST OBI

PRICE CONTROL BOARD

Food prices in Nigeria may never fall down if direct measures are not taken in the formation of an effective price control board.

Commissioners of Agriculture should help the nation in solving this drastic position of high prices of essential commodities.

I also suggest that an agricultural price control board be established with inspectors who can move into markets in rushing hours to arrest any person who may charge more than stipulated prices.

WARRI.

AUGUSTIN OSAGIE

CONGRATULATIONS

I feel happy to congratulate the 'Farmstock' and it's entire staff for the useful and important ideas I was able to absorb from it's last monthly.

As a farmer and an agriculture teacher I think I can never forget the "Farmstock" Monthly Magazine as a source for useful and important hints on agriculture.

As such I appeal to everyone on the side of agriculture to join me in congratulating the "FARMSTOCK"

IGBARIAM.

PETER ZACCHEUS

AVOID BURNING IN FARMS

Burning of grasses and trees is a bid to clear the farm up is very dangerous as this could cause much harm to the soil.

The cause of these burnings proves that farmers do not want to exhaust the energy they would use in making the farms, in cutting down the grasses and trees.

Furthermore, the use of fertilisers should be encouraged.

IBADAN.

ISHOLA OWOSENI

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School Farm

A recent report disclosed that a general world food shortage existed. The report also localised some danger spots, the causes of such setbacks in the production of food but it also suggested remedies.

On the West African Coast is Nigeria also

On the West African Coast is Nigeria also plagued like her neighbours by shortage of food. Though teeming with about sixty million three quarters of the population are under fifteen. This big chunk of the population though feeding like maggots cannot produce anything. To grow well they just need all the nutrients the nation can give them.

Even in the remaining quarter of the population are old people, infirm and aloof to worldly worries, hence equally unproductive. This batch constitutes about an eighth of the population. Briefly, in Nigeria our model country, one-eighth is feeding seven-eighths of the population. Any one can see why a general food shortage exists. The same conditions apply in many places.

Of the many remedies suggested one is the involvement of our school population in Agriculture. They can be trained and will eventually become farmers or breeders as opposed to oldies who are on their exist and so can be excused from the whole task.

The prosecution of the programme involving school children demands compulsion. Unless agriculture is certified a compulsory subject

some parents may support their wards who may refuse to study and practice farming. Such erring parents may think that agriculture will distract their childrens' attention from the Arts or Sciences for which their chaps are being groomed unmindful of the fact that the various disciplines are interwoven; thus to be successful in one calls for an inkling of the knowledge of the others.

Besides, since mechanisation is the answer to modern agriculture, farming therefore does not mean everyone going to till. The scientist has his part to play; so is the engineer and the financier. Only an early brush with agriculture can attune such minds to see what contribution to make to the industry in later life.

Quite surprisingly, many are unaware of the various departments of Agriculture. Therefore to attune young minds, supported by their parents, to the industry calls for much publicity not only on the grounds covered but also on the chances of becoming wealthy through agriculture since many view success in life not in terms of service but acquisition.

The Ghana experiment will continue to be a pilot scheme for many African countries and may be some countries will outshine Ghana eventually when the scheme is fully understood but as of now Ghana youths are in the frontline. That is as it should be; all those who want to eat ought to do something to help in the production of food.

From the Economic point of view:

AGRICULTURE West

I shall discuss this topic on the problems of West African farmers, the consequent causes of low agricultural productivity and their effort to modernise agriculture.

I shall then try to emphasize why agriculture is of paramount importance to the growth of the West African economy and offer suggestions as to how the level of agricultural productivity should be raised.

A large number of West African farmers still rely very heavily on the traditional methods of farming such as shifting cultivation and bush fallowing which leave sizeable portions of cultivable lands "idle" for upwards of 3-5 years after being previously farmed for an equal number of years. During this period of "idleness", such lands - almost amount to 40% of the total arable lands in some areas - yield nothing.

Besides, a lot of general labour as well as crude implements like traditional hoes, diggers, cutlasses are still being freely and widely used. The use of these consumes a lot of human energy and lowers the amount of work an average farmer can do daily. In some areas, such natural phenomena like flood, soil erosion, drought and unfavourable soil conditions conspire to make it impossible for modern implements to be applied.

In some areas, sophisticated farming machines are imported and later, it is discovered to the chagrin and woes of the people that many such machines are not tropicalised and when they get spoilt, hardly could their spare parts be found locally and where found, there are few technical experts to service such machines. These machines often break down and give rise to low productivity.

In the savannah regions (grassy areas), fire is usually set on the land for clearance. In the forest areas, trees are usually cut down and burnt. This process of burning often reduces the fertility of the soil. Very few farmers respond to the various government campaigns for the introduction of fertilizers and the application of insecticides on their farms.

A large majority of the farmers are uneducated and their activities are not properly organised. Even their costs of production are hardly related to their output. Ignorance and wholesale beliefs in superstition explain why many West African farmers attribute poor harvests and bad climates to supernatural causes and at times await the dictation of the local gods before harvesting certain crops.

COMMUNAL LAWS

The farmers' belief in the gods is so strong that large acres of useful lands are specially reserved for their dead ancestors as shrines or for the burial of local dignitaries. The land tenure system in West Africa is very complicated. Hardly are there genuine titles over certain lands especially in the rural areas. Most lands are communally owned but controlled by the village chief or family heads even though every adult has a right to use part of such lands.

This means that no portion of such lands could be pledged as securities for loans. This constitutes a serious handicap since such loans are badly needed and would have gone a long way to enable farms acquire modern agricultural implements, fertilizers, insecticides and improve seedlings. Besides, most lands are fragmented (broken) and each portion is separated by fences erected here and there.

The market for the disposal of large farm produce is limited. Moreover, there is poor transport and communications system. Many roads are not well constructed, some areas have only bush paths while some are not easily accessible.

These limitations hinder the free flow of agricultural products to these areas and together with the limited earnings of the majority of the people, constitute a discouragement to greater output.

Conscious of the importance of agriculture to the economic development of their countries, the governments of West African countries have been trying from time to time to embark on certain bold steps to modernise and improve the volume and quality of agricultural output in their countries. Many of them established PLANTATIONS. FARMING. GUINEA established the banana plantation.

IVORY COAST had coffee, cocoa and rubber plantations whilst in the FARMSTOCK

URE in Africa

by Fidelis O. Akpom
B.A. (Econs.) Durham
Dip. Ed. (Lagos)



CAMEROONS, there are oil palm plantations - even though most of them are foreign owned. In GHANA, State Farms have been set up. For instance, in 1965, state farms in Ghana occupied 66.4% of the total 960,784 acres of land under cultivation. They also owned oil palm plantations, irrigated rice farms and different kinds of plantations for mixed farming.

In NIGERIA, the FARM SETTLEMENT SCHEME was established. Carefully planned and organised farms were introduced for young and educated farmers who were exposed later to expert advice and credit facilities from the government. The potential farm settlers were properly trained in the various farm INSTITUTES established.

Later, these settlers with their families were offered sizeable farmlands - depending of course on whether such lands were for poultry, animal husbandry or for cash and food crops. Right now every state government in Nigeria has allocated considerable sums of money in their respective budgets towards improving the lot of the farmers and raising the level of agricultural productivity in the country. The overall aim is to prove that farming can be profitable and can effectively provide an adequate means of livelihood for all and sundry.

In LIBERIA, the American Fire-Stone Company realising the importance of rubber growth and development, pumped in a lot of money into the establishment of RUBBER PLANTATIONS. Improved modern and scientific methods of farming were introduced to raise the quantity and quality of rubber products in the country and then compete favourably in the world commodity markets.

Despite the obvious good intentions of these governments, the Farm Plantations, Farm Settlements and the State Farms encounter series of obstacles. Stated briefly, these include:

- (a) the costs of financing these projects have been too prohibitive.
- (b) the local people are often very unwilling to offer lands to the governments and as

such, some governments have to resort to compulsory acquisition of their lands - subject of course to either adequate compensations or where they disagree, court actions. In either instance it is a protracted affair leaving the parties worse off and causing unnecessary split in families.

- (c) The non-co-operative and apparent exhibition of dis-interestedness on the part of the local farmers have even stultified the government's efforts and frustrated and realisation of the hope that the scheme would be successful.

Nevertheless the Operation-Feed-Yourself-Programme which has just gathered its first harvest is the boldest agricultural venture undertaken along West Africa. The bumper harvest - (Farmstock November 1974) cleverly shows the village farmer what discipline and machines working together can achieve within a short period.

ECONOMIC IMPORTANCE

Agriculture is the mainstay of the West African economy. It is the largest contributor to the gross domestic products of these countries. It is the dominant source of foreign exchange earnings. It supplies between 75% - 80% of West African exports and the foreign exchange earnings realised help them to pay for the agricultural equipments (machines, tractors etc.) that help to modernise and expand industries, infrastructures and agriculture itself.

The majority of the capital projects carried out by these countries for sometime now are financed from reserves accumulated by the Marketing Boards from time to time from the total earnings of farm produce.

It is the largest employer of labour. Since West African economy is highly dependent on primary production, agriculture absorbs more than 70% of the entire working population.

It is also the source of domestic food staples both for the expanding industrial and urban population. Food crops like yams, cocoyams, beans, rice, cassava, groundnuts, maize, millet etc., are now made available

to satisfy the local food requirements.

It is the source of capital for the newly established industries in the country. It is the source from which labour is later released for work in the industries.

Agriculture supplies the old and new industries with the essential raw materials for production e.g. cotton for the textile industries; rubber and leather for the shoe factories; tobacco

leather for the shoe factories, tobacco for the cigarette industries etc. It also helps to relieve many local industries from relying helplessly on

industries from relying helplessly on the ever fluctuating world market prices for these commodities.

It also constitutes a potential market for the products of these new expanding industries - hoes, fertilizers, insecticides etc., produced in the industries are purchased for use in agriculture.

Taxes on agriculture, export crops and on the imports brought with the foreign exchange proceeds constitute the main source for public investment in many social, physical and economic infrastructures such as schools, hospitals, transport and communications, etc.

SUGGESTIONS

Apart from the current plans now being adopted for the promotion and improvement of agriculture by the various governments some helpful hints may still be welcome namely:

- (a) the use of labour-saving machines
- (b) the application of manures, fertilizers and the other soil enriching materials to improve the fertility of the arable lands
- (c) how to be less superstitious.

These could be achieved through

- (a) public lectures in the local language by experts on the subjects.
- (b) through mobile cinema shows and also

- (c) through exhibitions and open air demonstrations on the use of these implements and equipment.

Young school leavers should be induced and encouraged to take to agriculture. This could be done by making the condition of living in the rural areas very attractive.

The governments should liberalise credit facilities for farmers and grant them loans without demanding unreasonable securities. Credit banks should offer short-term loans to these farmers. Farmers should be made to buy improved seedlings and farm equipment etc., at subsidised prices.

The governments should endeavour to diversify their economies through the establishment of more industries that would consume considerable percentage of the farm products instead of relying mainly as they do now on the export of few cash crops whose prices are ever fluctuating.

More markets, especially in Eastern Europe should be explored while at the same time, the link with the traditional consumers in the U.S.A and Western Europe should be further strengthened.

GHANA PLANS FOR

Ghana is to hold its third International Trade Fair in Accra from February 1-15, 1976. From then, the Fair will be held every two years instead of once in four years.

A special committee comprising 15 members has been set up to organize the fair.

Lt.-Col. (Alhaji) D. A. Iddisah, Commissioner for Trade and Tourism and chairman of the committee, said the character of the third International Trade Fair would be different from those of the two previous ones.

The Commissioner told a press conference at the Ambassador Hotel in Accra that emphasis would be placed on agricultural machinery and implements, fertilizer plants and storage.

"The main theme of the fair is 'Machines and Implements for Food Production'."

The third fair, the Commissioner said, would inaugurate a regular international event in the country.

"We are inviting all manufacturers to assemble their latest machines and gadgets which will help to feed the millions who desperately need food". Lt.-Col. Iddisah said.

"We invite them to bring not only their fertilizers, but also their fertilizer plants, especially those which can be assembled easily and cheaply and worked with ease in developing countries".

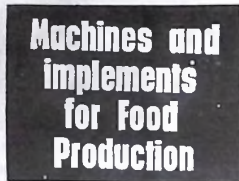
Lt.-Col. Iddisah touched on storage of agricultural products which he described as a great problem in many countries, including Ghana.

That was why, he added, the Government had invited scientists, industrialists, manufacturers and traders all over the world to exhibit those of their products which might help tropical and developing countries in general to solve the problem of food storage and supply.

The Government had also invited all developing countries, especially African countries, to come and see what is available in the field of agricultural implements, fertilizers and storage plants", he said.

The Commissioner said the Government would do all it could to make the stay of exhibitors and visitors as pleasant as possible.

FAIR



He expressed the hope that Ghanaian manufacturers would "try to show our visitors what they have done and are doing to support the policy of self-reliance and especially 'Operation Feed Yourself'".

Lt.-Col. Iddisah said the third fair would provide a unique opportunity to sell and buy vital machinery and plants which are needed "if we are to feed ourselves on our small evershrinking planet".

CHURCH ON AGRICULTURAL CRUSADE

The Hierarchy of the Church of Pentecost of Ghana have urged religious institutions in Africa to mobilise the youth for an agricultural crusade to free the continent from hunger and want. For too long, they said, Africa had relied on outside help to feed its growing population, adding "let us accept the clarion call of Ghana's National Redemption Council (NRC) to grow more food to feed ourselves and our former benefactors".

Opening a four-day annual convention of the church being attended by more than 7,000 members from Ghana, Dahomey, Ivory Coast and Togo, recently the Reverend T.A. Narley noted that if the continent's vast stretches of land now lying waste were fully utilised, there would be abundant supply of food for all".

AGRICULTURE, ITS ROLE IN GHANA

Agriculture contributes 42 per cent of the country's gross domestic product and employs about 60 per cent of the country's working population. But the renewed emphasis given to the strategic role of agriculture in the national development in recent times is never in doubt.

The "Operation Feed Yourself" programme is the N.R.C. Government's policy of rapid development of agriculture for self-sufficiency in food, livestock and industrial raw materials to feed existing factories and for export.

The N.R.C. Government's agricultural programme has taken some definite strides. Agriculture today is no longer considered by Ghanaians as the preserve of those without formal school education. People of all levels of the social strata are actively taking to agriculture.

Already, millions of acres of land have been brought under maize, rice, millet, cassava, yam and vegetable cultivation. In 1972 alone over five million acres of land were cultivated and in 1973 combine harvesters had to be brought into the country to facilitate the harvesting of cereals.

Northern Ghana according to the 1974-75 budget proposals, is today being turned into the nation's granary. In a recent interview, Colonel Bernasko, Commissioner for Agriculture had this to say: "We have 92,000 bags of rice stored away and we intend to carry on with this pattern every year".

please continue overleaf



Electricity plays a very important role in the life of a modern farmer be he a crop or livestock keeper. In picture above, animal and poultry feed is mechanically produced at the Government Farm Centre, Alege.

There is, however, still more to do in respect of making this country economically self-sufficient. One unfortunate aspect of this country's agriculture is that its massive support of the economy can be attributed to only one crop - cocoa. Cocoa alone cannot sustain the economy at all times so that it is necessary to seriously start diversifying the economy by growing other exportable crops.

There are also problems with the supply of machinery, seed fertilizers and insecticides to the farming population. Storage, transportation and marketing facilities have been inadequate and inefficient. The land tenure system has still not been properly put in the right perspective, hence prospective large farmers have had to contend with cumbersome procedures of acquisition of large tracts for their operations. It is no wonder therefore, that the country still continues to spend a sizeable portion of its hard earned foreign exchange on food imports.

It is hoped that with the launching of the third phase of the "Operation Feed Yourself" programme a long way would be reached in the country's search for a meaningful self-sufficiency in the economy. Greater emphasis ought to be laid on the marketing and storage systems so as to ensure efficient supply of food items on the markets.

In this regard the First National Agricultural Fair should be viewed in very important perspectives. All important agricultural requirements of the country can be effectively emphasised at the fair so that every achievement made whatever is still in the process, and the projections for the future would be seriously reflected.

GHANAIAN FIRMS MAY JOIN IN KAISER RICE PROJECT

The Government of Ghana and a number of Ghanaian financial institutions may participate in the Accra

Plains rice project. A Statement issued in Accra by Mr. J.V.L. Phillips resident manager of the Volta Aluminium Company, said the VALCO has had discussions with the National Investment Bank, the Agricultural Development Bank and the Standard Bank of Ghana which had expressed an interest in participating in the project.

Kaiser Aluminium have now entered into an agreement with Hawaiian agronomists to conduct a feasibility study and prepare a report on the development of a commercial rice project of 5,000 to 10,000 acres, the statement said, adding, "If the feasibility study establishes the commercial desirability of a large scale

rice project in the Accra Plains and the Government concurs in this conclusion, Kaiser Aluminium, in conjunction with the Government, its institutions and the technical partner, would hope to establish such a project.

Expressing the belief that the project would be fully consistent with the N.R.C.'s programme of achieving self-sufficiency in agriculture, the statement said if it "becomes successful and profitable", it would also serve to stimulate other agricultural projects in the area by Ghanaian and other investors.

The statement recalled that after a series of negotiations between the Government and Kaiser Aluminium, its engineers arrived in the country in August, last year, to conduct a survey and make recommendations on the project.

ANIMAL FEEDS

The East Central State Agricultural Department Authority for livestock projects at Nekede and Ninth-mile Corner, near Enugu will produce 24,000 tons of animal feeds annually when in full operation.

This was disclosed recently by the Manager of the livestock project at the Ninth mile Corner, Mr C.I. Iheanacho.

YAMS DONATION

The Enugu Yam Sellers Association recently donated about 300 yam tubers to the Enugu Social Welfare Council in response to the council's call on the public spirited organisations and individuals for financial and moral support to the council.

The Enugu Social Welfare Council is humanitarian organisation which caters for the less fortunate citizens.

The Principal Welfare Officer of the Enugu Social Welfare Council Mrs. Pauline Ojike expressed the need for agriculture and urged the Yam Sellers Association to encourage it's farming sector in abundant production of foodstuff.

BUMPER HARVEST

There have been bumper harvests of food crops from state owned farms in the North Western State, a Government Spokesman disclosed.

Stating further the spokesman said that in places like Sokoto, surplus crops of millet, rice and maize will be stored under the Governments grain reserve programme.

54m NAIRA FOR AGRICULTURE

Nigeria has received from the World Bank a loan of 54 million Naira for rural agriculture development.

This was announced recently in Legos by the Cabinet Office.

It said that the loan represented 50 per cent of the estimated costs of rice project in the East Central and South-Eastern States and rural agricultural schemes in the North Central, North Eastern and North Western States.

TECHNICAL ASSISTANCE FOR LIBERIA

President Tolbert of Liberia said that he saw trade possibilities in rubber sales to, and purchase of sugar and rice from, Guyana, but the major problems would be transport.

He also raised the question of Guyanese technical assistance for Liberia, particularly in agriculture.

Speaking further, Mr. A.C. Jackson,

Junior Registrar of the Episcopal High School, expressed dissatisfaction about the Educational Policy of Firestone Plantations.

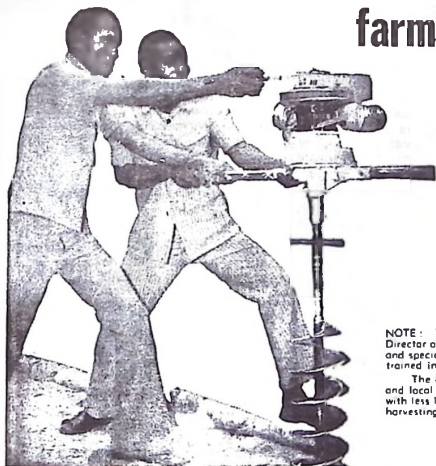
He said Firestone, the oldest foreign company in Liberia exporting huge quantities of best grade rubber had not provided a single high school, since it began operations in 1926.

SUPPLIES TO FARMERS

Farmers in Kwara State are to be supplied with fertilizers, insecticide and tractors for hire at moderate charges. They would also benefit from irrigation, soil reservation, fisheries project and granaries.

This was announced by the Publications Department of the Ministry of Home Affairs and Information, Ilorin.

At present, according to the report, a sum of 610,000 Naira had been spent on the expansion and improvement of two agricultural Training Centres in Osaro and Ilorin, and the establishment of a farm centre in each of the eleven administrative divisions of the state.



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FARMERS GET GOVERNMENT SUBSIDIES

The East Central State Department of Agricultural Extension has presented large quantities of various food commodities to 49 progressive farmers in Arochukuw division. This is as a result of the world food programme "project 775" now being implemented throughout the state.

Project 775 is a world food programme whereby tree-crop farmers, mainly oil palm, rubber and cocoa farmers who have established new plots of tree-crops since 1970 are given encouragement to enable them maintain their plantations up to good standard.

MECHANISED AGRICULTURE

Farmers cannot derive full benefits from the agricultural programmes prepared for them unless there is a dynamic knowledgeable and efficient extension service. The Military Governor of South Eastern State, Brigadier U. J. Esuene has said in Obubra.

It was with this understanding, Brigadier Esuene pointed out, that the State Government made consistent efforts to train junior and middle-level technical manpower in the five schools of agriculture in the country and later decided to establish a multi-discipline school of agriculture in Obubra.

Esuene was delivering a lecture at the graduation ceremony of the pioneer students of the School of Agriculture at Iyamitet in Obubra division recently.

N27,000 SET ASIDE

The Area Development Board in Sokoto has set aside N27,000 for the improvement of general environmental sanitation in the township. Chairman of the Board, Alhaji Abdulkadir Abubakar J. Kalgo said, of the amount, N25,000 had been spent in the exercise.

The Chairman said his Board, in collaboration with the Local Authority and the State's Ministry of Health staff was trying to educate house owners to construct socket pits in their respective houses to the public drainage

NEW FARMERS TO GAIN

The North Western State Government has reached an agreement with the Nigerian Agricultural Bank (NAB) to grant a loan of 4.5 million Naira for the establishment of a loan scheme for farmers in the State.

Announcing this recently in Sokoto, the State Commissioner for Agriculture and Economic Planning, Alhaji Ibrahim Tako Galadima said the agreement on the loan would soon be signed.

GARI INDUSTRY

The foundation stone of a 6,000 Naira gari industry has been laid at Omega Achara, in Ezzikwo Division, East Central State.

The ceremony was performed by the senior Co-operative officer for Ezzikwo, Mr. D.M. Chuku Nwosu on behalf of the registrar of Co-operatives at Omega Achara Ikwu.

Nwosu described the industry as an important milestone of the economic and social development in Ezzikwo.

The industry is expected to give employment to more than 50 workers.

FOOD CRISIS AHEAD

The Food situations in Nigeria is going to get worse before it gets better.

The report is alive with alarming facts and figures pointing to many years of hardship for Nigerians.

The basic fact is that the gap between food production and food needs is growing rather than diminishing.

The basic cause of this is that the rural population which provides the food, is growing less slowly than the urban population. An additional factor is that about half the population of independent Nigeria is under the age of fifteen, meaning that it needs to eat well, but plays no part in food production.

Some months ago tubers of yams were donated by the Mid-West government to drought victims in the North Central State to avoid massive hunger.

Government and the people must invest more in agriculture to avoid food shortage.

GHANA APPLIES FOR AID

The Chief Executive of Ghana Cocoa Market has appealed for N5 million from the World Bank for Ghana's Cocoa Industry's development Limited, Col. Kwatu and Takyi (Chief executive) made the appeal during a meeting with the World Bank representatives and Cocoa Association of London. From a peak of 557,000 tons in 1964-65 representing 38% of world production, Ghana declined to 400,000 tons in 1973-74 representing 30% of world production.

These were caused by the age of the cocoa trees and the death of some of the farmers. A number of spraying machines, chemicals and matchets have been provided for farms to boost production.

LOAN FOR RICE

The Bank of Ghana will guarantee loans from the Commercial Banks to the rice mills for the purchase of rice during the current harvest season.

Mr. C.T. Nelson, Executive Director of the mills, has said that negotiations to this effect has been completed that the loan, based on a system called "Special Credit facility for agricultural produce marketing" will be a revolving fund to be refundable when the cheques matures after 80 days as in the case of cocoa.

AID FOR SIERRA LEONE

Dr. Waldheim, UN Secretary General, has authorised disbursement equivalent to 750,000 Naira from the UN Special Account for the Emergency Operation (UNEO) to Sierra Leone in continuation of the UN's effort to aid countries most severely affected by the prevailing economic crisis.

In a message to recipient governments, the Secretary-General has suggested that the funds will be used for buying fertilizers.

continue on p.15

FARMSTOCK

New weapon in the war against Insects

by Arthur Motte
a London journalist



Insects eat about one third of all the world's food production before hungry people have a chance to get at it. In the developing countries much more food is lost in this way — and some of the insects kill millions of people every year by spreading diseases like malaria.

It is not surprising that the insect is one of the principal targets for the scientist; without his pesticides no amount of fertiliser would be able to make up the losses in food crops.

Twenty years ago it was thought that heavy applications of synthetic chemicals would solve the problem. But insects developed a resistance to them, and the chemicals steadily polluted the environment.

Call For New Control

There was an urgent call for a new pest control which would protect the growing plant and also its crops when they reached the food storehouses of the world, without making them harmful to man and his environment.

To find it, scientists at the oldest plant research station in the world at Rothamsted, near London, turned to one of the longest known natural insect killers in the world — pyrethrum

This is found in the flowers of the pyrethrum plant, which grows in Kenya and other parts of Africa.

They triumphed with a new pesticide — a synthetic chemical known as NRDC 143 — which does not pollute the environment. NRDC 143 kills off insects that have become resistant to existing pesticides and is many times more potent than products already discovered.

Earlier synthetic pyrethrins break down very quickly when exposed to the air and sunlight and, although this makes them non-polluting, it limits their use to indoor pest control.

Effective - And Cheaper

NRDC 143 remains active for about three times as long as natural or earlier synthetic pyrethrins, is cheaper to produce, and is highly effective on a wide variety of insects, among them the Army worm, white fly, aphids and



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grain beetles. It kills only insects and is said to be completely harmless to human beings and all forms of livestock.

This means it will be of great value in protecting stored crops without frequent application. It is difficult to protect stored crops with present insecticides because of the risk of harmful substances getting into the food.

There will be plenty of room in the world for both NRDC 143 and natural pyrethrin. Kenya is growing new plants with higher insecticidal content and other advantages. Vast quantities of both are needed to conserve the world's food supplies. ■

Diseases of poultry

FOWL POX

by Our Livestock Correspondent

FOWL POX IS A VIRUS DISEASE OF POULTRY, WHICH MAINLY AFFECTS CHICKENS, BUT CAN ALSO OCCUR IN TURKEYS, PIGEONS, GUINEA FOWL, AND QUAIL, DUCKS AND GEESE ARE NOT AFFECTED, NEITHER ARE HUMAN NOR ANIMAL. IT IS ONE OF THE OLDEST KNOWN DISEASE AND CAUSES LOSSES IN MOST COUNTRIES.

The most typical symptoms are pox marks on the comb and wattles. These marks start as small grey-white spots, which grow rapidly, and turn yellow. There may be few or many. In severe cases the bird's head may be covered in rough, wartlike growths, which may also be found under the wings, round the vent, or on the legs and feet.

In time the pox marks dry into brown scabs surrounded by red inflamed areas. After a few weeks the scabs drop off, leaving a smooth scar, unless bacteria have entered the site, when the whole is more severe.

AREAS OF INFECTION

In some birds the virus grows in the cells lining the mouth and throat, causing yellow-white nodules which grow rapidly, and may become thick enough to interfere with eating. Similar growths may come in the sinuses, and interfere with breathing, or in the eyes.

The effect of growth and production depends on the extent of the disease in each bird. In some flocks the disease spreads rapidly, and in others quite slowly. Wounds caused by sharp pieces on the cages or equipment may increase the spread of the disease.

DIAGNOSIS AND PREVENTION

Diagnosis can usually be made by inspection of the birds. Laboratory methods can be used if there is doubt, and include the examination of thin slices of the comb to look for "inclusion bodies" which are typical of fowl Pox.

Another method is to apply diseased material to the comb of a susceptible bird to see if it gets the typical pox.

There is no cure for Fowl Pox. Good husbandry will generally reduce the effects of the disease, otherwise it must run its course.

Prevention is by vaccination. A live virus vaccine is used, and is applied to the wing web by jabbing it with a two pronged needle which has been dipped in suspension of the virus.

Because the virus is applied by such an unnatural route as the wing web it does not produce the disease, but does produce an immunity, which should last for the life of the bird.

WHEN TO VACCINATE

The vaccination is best made between six and twelve weeks for best results. If it is used before six weeks the birds immunological system is not fully developed, and so the immunity produced is weaker.

By twelve weeks the birds ought to be protected. However these are not rigid limits. For example the vet may advise vaccination earlier than six weeks if he considers the risk of early infection great.

Again the time may be planned to fit in with other vaccination.

Fowl Pox virus is exceptionally long lived outside the bird. A survival period of twelve months has been quoted in some conditions. There are related Pox viruses, which take their name from the bird most commonly affected by them: Fowl Pox, Turkey, Pigeon Pox and Canary Pox.

Each virus can infect each species of bird, but more mildly than its own kind. An attack of one virus will give the bird partial immunity against attack by the other kinds.

West to aid Farmers

Several agricultural projects, designed to meet high cost of living in the Western State, have been embarked upon by the state's Ministry of Agriculture and Natural Resources.

The projects will serve as an impetus to farmers in the efficient production of food in adequate quality and quantity for the state.

This was made known recently by the state's commissioner of Agriculture and Natural Resources Dr. Gbolahan Ashiru at Shagamu while performing the official opening of the sixth Abeokuta/Ijebu Circle Agricultural Show.

In addition, he pointed out that 354 acres of rice and 230 acres of Western yellow maize as well as 469 acres of cassava had also been planted to ensure that farmers had

the same quantity of these crops in the next planting season.

To assist farmers to accelerate more food production, he said loans totalling N16,000 has been made available to farmers in the circle through the Agricultural Credit Corporation (ACC).

RISE IN COCOA IN GHANA

Cocoa values have risen sharply and the London terminal market Dealers were at a loss to identify the precise reasons for the rise in cocoa. The USAID's Foreign Agriculture Service put World Cocoa Bean Production in 1974-75 at 1.45m tons up by 1 per cent over 1973-74. It said the improved weather conditions will boost African production.

HAWAIIAN AGRONOMISTS IN GHANA

A Team of rice experts, agricultural and irrigation engineers will arrive in Ghana very soon to prepare

plans of large scale agricultural development - in the Accra plains.

The team, from Hawaiian Agronomics Company an international agribusiness, engineering and management consulting firm, will undertake the project in partnership with Kaiser Aluminium and Chemical Corporation.

This was disclosed by Mr. Wayne Richardson, President of Hawaiian Agronomics. He disclosed that between 5,000 and 10,000 cultivated acres would be agriculturally and economically feasible

He said they believed that this project would further Ghana's "Operations Feed Yourself" programme by meeting basic food need, producing a viable new commodity entity and reducing the over-flow of foreign exchange for a commodity which they felt could be economically grown.

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African students

● The Patrice Lumumba Friendship University in Moscow trains highly qualified national cadres of specialists for the developing countries. The most capable of its graduates, having received experience in their speciality at home, return to the university for a post-graduate course.

Here in Moscow, at a modern clinic of the Ministry of Railways of the USSR, the Nigerian doctor Mustafa Dapo Saliu-Lawal underwent post-

graduate practical work. He and his colleagues enjoyed sitting in the clinic's park during intervals, to converse about their affairs and concerns. Three years of post-graduate work have gone by. The friends decided to bid farewell to the clinic to its people, and the Russian bar-

Photo shows (left to right) Costas Michailidis (Cyprus), Karuna Appahamy (Sri Lanka) and Mustafa Dapo Saliu-Lawal (Nigeria).

In these days, when the Soviet people are marking the 20th anniversary of the cultivation of virgin lands (immense spaces in the south of Siberia and Kazakhstan), APN's correspondent approached the Editors of the Druzhba newspaper put out by the Patris Lumumba University in Moscow. Among those who sowed and reaped the grain on those tracts, who built houses, schools, granaries and workshops, were students from Africa. Their impressions were featured at different times in Druzhba, and the Editors kindly permitted us to cite some of them.

"The work of the student building teams," wrote a group of African students who were members of the University's International Teams, "enabled us to familiarise ourselves closely with the cultural and spiritual values of the Soviet people, to see the country not on a map, but in reality."

"We saw how gigantic electric stations went up on the virgin tracts, how the grain ripened, how cities were built and village appointments improved."

TESTING GROUND

"The virgin land is a place where friendship is tested," wrote Narandranat Luchmaya, a Mauritanian student of the Department of economics and law. The virgin land is a place where we saw how man rendered barren land fertile.

"I worked in building teams twice, and was amazed by the boys' preparedness to sacrifice a great deal for the sake of carrying out the set aim, of surmounting all difficulties.

Also, I liked the virgin land because it offered a great field for youthful endeavour. The members of our team worked on eight units and did the jobs in time. Everything done by our hands will remind the local people about us students of the Friendship University.

"I shall never forget our firm student friendship which became still stronger in the building teams," wrote F. K. Mwanya of Uganda, an undergraduate of the Department of economics and law. There we worked, and rested too,

delivering lectures and giving concerts.

"I am often asked: 'What do the virgin land do for you?'" wrote a student from Botswana. "Today I want to reply that for me the virgin land was a school which taught me to work. Now I can do the job

Fish Offal For Pigs

Minced and acidified fish offal is an acceptable form of protein for pigs according to experiments at the Harper Adams Agricultural College in Shropshire, England.

In two trials, each lasting three months and involving more than 100 animals, the fish offal replaced traditional fish meal in the ration without any adverse effect on either liveweight gain or feed conversion.

Moreover, one advantage of fish offal was that it was liquid and therefore, suitable for pipeline feeding.

Analysis of the fish offal showed that its protein, oil and ash percentages were 15.66, 2.60 and 3.60 respectively. Dry matter was 22 per cent.

bricklayer and carpenter. Besides, on the virgin tracts I receive excellent idea of life replete with friendship, camaraderie, internationalism. I am glad I'm going back home not only as an economist, but also as a builder."

"For a specialist it is very important to know what common labour is like, to get the feel of it," wrote Joseph from Nigeria. "Only he who works, lives a full

"For the youth the construction site is a school of life." "It's a tradition for our international 'youth of the planet' team to go each summer to the virgin lands," wrote Edmund M'Boulou Monso of Zaire an undergraduate of the Department of economics and law, who has been to the virgin lands five times.

LASTING FRIENDSHIP

"In 1973 our team again won first place among those working in the district. That is also a pleasant tradition. "After

working hour... we often got together with the local population," wrote Edmond. "Our boys delivered lectures about their countries, and gave concerts of African music and dances. The residents of Shortanda are hospitable and pleasant people. We felt their warm concern for us from the very

In the boundless steppes stretching for hundreds of kilometers from one village to another, there are now grainfields and gardens and forests. The people of the virgin-land have turned the steppes into a rich granary, and the African students have made their humble contribution to this great

on the virgin tracts

By N. Sologubovskiy

first day of our arrival there. We became friends.

"Our work in the virgin land teams benefited us African students and helped us better to understand the life of the Soviet people. It strengthened our friendship with the Soviet youth.

Edmond concluded: "I shall always recall the wonderful virgin-land!"

cause, a contribution that shall not be forgotten.

As many as 1,340,000 Soviet people were awarded "for developing the virgin lands" medals for their selfless work. Edmond M'Boulou Monso also received this medal, among other African students, for whom the virgin land proved a second university.

The Laggardly Limousin

A survey in Britain by the Milk Marketing Board has shown that the average Limousin-sired calf is carried 20 days longer than the Simmental, three days longer than the Charolais and five days longer than the Hereford.

significantly inferior to the record when Hereford bulls are used and when less than 1 per cent of the calvings prove to be difficult.

from the Agricultural Research Council.

High yielders show more benefit than low yielders from extra food and so does the cow in early lactation compared to the cow in mid lactation.

Level of yield and hence level of feeding in early lactation sets the pace for the remainder of the lactation.

Therefore the farmer must pay more attention to preparation (steaming up) before calving and to post-partum feeding (challenge of lead feeding) in order to maximise peak yield which is the key issue in the whole food milk problem.

Over the few critical weeks after calving food intake is low. The cow is thrown back on to mobilisation of body reserves to assist reaching her highest peak yield. These body reserves have had to be stored prior to calving.

please continue overleaf

agricultural notes

In fact, the Limousin-sired calves are carried longer than any other breed the Board has ever measured.

The calves were born out of Friesian cows, with difficult calvings averaging 2.4 per cent of the total when the sire was a Limousin.

Although better than the Simmental average of 3.5 per cent, it was signi-

Getting The Feed Yield Equation Right

How much extra milk a cow produces from extra food has been the subject of trials at the National Institute for Research in Dairying at Reading in Berkshire.

"These questions have been answered," says a report on the research

A concept of feeding covering the lactation cycle as a whole is thus built up particularly when health and fertility are added as further factors dependent on adequate nutrition.

Good quality forages always assist the farmer in reaching his multiple objectives, the report says.

to such an extent that it was no longer always valid to say that maximum yield was commensurate with maximum profit. In other words - the last few pounds of cake might not increase yield enough to pay for them.

Hence the proposition: how much more milk does a cow produce from extra food and how does a "good" cow compare to a "bad" cow in this respect?

Selenium Vital In Poultry Feed

Although needed in only minute amounts in poultry feed, selenium is nevertheless a very necessary part of the birds' diet, according to Hy-Line International expert Dr. C. Howe.

Selenium, a non-metallic element resembling sulphur, has previously found its way into diets via fish meal - now in seriously short supply.

"Although selenium can be poisonous in excess amounts it is very necessary in smaller amounts," said Dr. Howe. It was a vital trace element for many species, including poultry.

Lack of it induced poor growth rates and feathering, and the birds developed fibrotic degeneration of the pancreas, while breeder flocks suffered from reduced hatchability.

Only one gramme of sodium selenite was needed per five tons of feed, according to Dr. Howe, and in countries where its addition to feed was banned, the additive could be given with water at the rate of 50 parts per billion.

Robot Tractor A Step Nearer

The completely automated tractor is reckoned to be a step nearer following work on a new driverless system being developed by the National Institute of Agricultural Engineering at Silsoe in Bedfordshire.



NEW SILAGE TRAILER HAS REVOLUTIONARY SAFETY FEATURE

A revolutionary tipping action, incorporating an anti-jack-knife safety feature, is claimed for this new silage trailer which has recently been introduced by a British manufacturer. Known as the "Model S" silage trailer it won the supreme award in the new equipment competition at an International Dairy Show in Britain recently.

A recurrent hazard with conventional trailers is the possibility of the container jack-knifing when tipping a compacted load - this danger being totally eliminated with the Model S. As the floor tips to the rear the silage container, which is anchored to the front chassis, rocks forward on a central pivot allowing the load to discharge freely through the base of the container. At no time during the operation does the centre of gravity pass behind the rear axle, thus eliminating the danger of jack-knifing and allowing tipping to take place close to previous loads or other obstacles.

The Model S, which can be towed by any make of tractor, also features full remote control allowing the farmer to position the trailer and un-load the grass or similar fibrous material without leaving his driving seat. Three versions of the trailer are available; two basic models, the 12S (5 ton capacity) and 14S (10 ton capacity); and the 16S which is a 4-wheel turntable trailer.

Bateson Trailers Limited, Doodfield Works, Windlehurst Roda, Marple, Cheshire, England.

The firm is interested in appointing overseas agents or manufacturing licences.

Still at the beginning of a five-year programme, the system utilises an optical sensor linked to the wheel of the tractor.

The experts in charge, Messrs J.R. Stansfield and G. Harries of the control and instrumentation division, believe that with increasing labour shortages greater reliance will have to be placed on such systems.

The new system follows earlier research with acoustics and a pneumatically-operated furrow wall steering device. And while it is expected to cost more - present estimates put it at well over £1,000 - the fact that it has fewer moving parts makes for simplicity plus the fact that it need not be lifted each time for turning at



1974 ROYAL SHOW AWARDS FOR NEW FORESTRY COMMISSION TRACTOR

Two major British awards were made to the Forestry Commission for this new hydrostatic four-wheel drive forest tractor at the 1971 Royal Show at Kenilworth, Warwickshire, in the English Midlands. These are the Burke Perpetual Challenge Trophy for new implements awarded by the Royal Agricultural Society of England, and one of nine silver medals awarded by the Society for entries in the annual Silver Medal Machinery Competition.

The tractor is powered by a Ford 1000 engine and the frame is articulated about a centre pivot. In the front section is the engine, hydraulic pump and the driver, the rear section contains two hydraulic timber winches. The main hydraulic pump provides a stepless variable transmission with reversing and dynamic braking. The timber winches have axial flow motors inside the drums and are controlled either electrically from the cab, or by VHF radio transmitter worn by the driver. Prototype tractors for test work were built in the Forestry Commission workshops and commercial production is being undertaken by a British company.

The three main themes of the 1971 Royal Show were fuel economy crop health and forage conservation. This was the 126th Royal Show and the 12th at the present permanent site. There were 721 trade stands against 678 last year and international interest were reflected by seven overseas pavilions which in the case of Canada and Holland were doubled in size.

FORESTRY COMMISSION, 25, Drumheugh Gardens, Edinburgh S11 7RS,

headlands if a suitable device for the latter operation can be incorporated into the equipment.

While designed primarily for ploughing, the equipment will, it is hoped, be further adapted for cultivation and drilling, although for that it must be developed to follow less clearly

defined ground features than those necessary for ploughing only.

At present it consists of a side-mounted projector which casts a 12 in. beam on the ground at 90 deg to the furrow, with tractor and plough lined up when the beam is split equally between the furrow bottom and the returned soil.

An optical receiver is angled towards the light bands and images produced on photo-detector cells are amplified for transmission to an electric motor which operates the steering wheel.

"Early field trials look promising", Mr. Harries says. "We have worked the machine unattended at up to 3 mph and by modifying the power steering mechanism should make higher speeds possible."

Specialist Power

Vehicle Demand Forecast

While the two-wheel drive tractor will continue to be the main farming tool for some years to come, demand will increase for specialist self-propelled vehicles, predicts Dr. M. Dwyer, head of the tractor department at the National Institute of Agricultural Engineering, Silsoe, Bedfordshire.

For example, the mass-produced tractor working at about 4½ miles per hour on most cultivations tended to become less efficient at converting engine horse-power into draw-bar power as the size of the engine increased.

On heavy land the maximum draw-bar power which can be utilised efficiently is 54 hp while on light land the figure is about 67 hp, corresponding to engine horse-power of 63 hp and 79 hp.

"In both cases reversible ploughs provide better tractive efficiency and on light land they should be semi-mounted to retain adequate steering ability" Dr. Dwyer said.

Beef Building Type Not Important

A two-year survey of 589 farms by the Meat and Livestock Commission has found that the type of building used in beef production makes no difference to the performance of the cattle finished intensively.

"Cheap covered yards are as good as expensive purpose-built buildings," said MLC beef specialist Mr. J. E. Sunderland, commenting on the survey at a recent conference held at the National Agricultural Centre, Stoneleigh, Warwickshire.

husbandry in West Africa. Detailed study of the more common diseases of local farm animals, preventive and control measures, in respect at least one of each type of

- (i) Virus-fowl pox, foot and mouth diseases, rinderpest.
- (ii) Bacteria-Anthrax, tuberculosis, contagious abortion.
- (iii) Fungi-Scabbies, ringworm.
- (iv) Protozoa-trypanosomiasis, coccidiosis.
- (v) Metabolic-milk fever, ketosis, rickets, bloat etc.
- (vi) Mycoplasmatles-pleuro-pneumonia.

6. MANAGEMENT OF FARM ANIMALS

Detailed study of management aspects of the following farm animals from birth to maturity:
 Monogastric e.g. pigs, poultry
 Ruminant e.g. sheep, goat, cattle.
 Herbivore e.g. rabbits, guinea-pigs.

A field study of at least one animal from each class is essential.

7. BREEDING AND IMPROVEMENT OF FARM ANIMALS

- (a) Aims.
- (b) Principles of genetics in respect of animal breeding.
- (c) Methods: Selection, inbreeding, crossbreeding and effects. Artificial insemination. Castration.

E. AGRICULTURAL ECONOMICS

1. Factors of production-land, labour, capital, entrepreneurship.
2. Law of diminishing returns.
3. Principles of demand and supply.
4. Marketing of agricultural products.

- (i) Operations-Processing and storage, packaging, transportation and distribution.
- (ii) The role of the producer, middlemen and the consumer; individuals, co-operatives, corporations, firms, Marketing Boards.
- (iii) International Trade with respect to agricultural produce.

5. Agricultural Financing-sources and nature of farm credit and financing.

6. Farm Record
 Farm diary, input records, production records, farm inventory, farm log-book.

7. Simple Accounting

Preparation of entries of sale and purchases, profit and loss accounts.

PRACTICAL EXAMINATION

During the course the candidate is expected to have carried out and participated in practical work on livestock management, farm and vegetable gardening practices. Candidates should also be exposed to the major products of the forest type in their locality.

It is essential that candidates go on field trips to farms in different ecological areas and game reserves within the country.

The Practical Examination will test comprehension, skill observation and recognition.

SYLLABUS

A. GENERAL AGRICULTURE

Identification, uses, and maintenance of common farm tools, implements and simple farm machines.

B. SOIL SCIENCE

1. Identification of common rock types (igneous, metamorphic and sedimentary).
2. Soil profile from practical field work.
3. Laboratory work on physical properties of soil:
 - (a) Mechanical analysis using the hydrometer method and sieves.
 - (b) Determination of particle density and total pore space.
 - (c) Determination of moisture content of a moist soil sample.
 - (d) Determination of maximum water holding capacity.
 - (e) Determination of wilting point to be demonstrated.

4. Laboratory work on chemical properties of soil:

- (a) Demonstration of use
- (a) Demonstration of use of pH meter.
- (b) Demonstration of active or reserve acidity using the pH meter, and colorimetrically, using a comparator.
- (c) Evidence of cation exchange by displacement of cation with potassium and precipitation of the displaced calcium with ammonium oxalate.

C. CROP SCIENCE

1. Identification of seeds, seedlings, fruits, storage organs and other essential parts of the more common crop plants, local weeds, pasture grasses and legumes.
2. Identification of casual organisms (where possible), nature of damage prevention and control methods for the common crop pests and diseases.
3. A working knowledge of planting dates, seed rates and plant population, germination testing of the more common local crop and plant population, germination testing of the more common local crop plants is essential.
4. Candidates may be tested in the following skills:

Preparation of seed beds, fertilizer applications, mulching, watering, use of spraying equipment, vegetative propagation, germination testing.

D. ANIMAL SCIENCE

1. Identification of the more useful breeds of animal types available in the student's locality. Methods of restraint, handling, and growing farm animals.
2. Identification of the major internal organs of farm animal (no microscopic studies), e.g. organs of the digestive systems, liver and kidney.
3. Identification of the common ectoparasites (e.g. ticks and lice).

Agriculture for schools

FAMILIES IN OR NEAR THE FARM

Special names are often given to animals and birds to show which is the MOTHER (adult female), FATHER (adult male) and YOUNG (offspring). One member of each family below has been written in for you. Fill in the other family members in this order: 1. Mother; 2. Father; Young. The GEESSE are already filled in as an example.

Subtract five points for each one you miss. A perfect score is 100 points, but 75 points is very good.

COW

SHOAT

STAG

CYGNET

FOAL

LAMB

NANNY GOAT

ROOSTER

GOOSE

GANDER

GOSLING

DUCKLING

ANSWERS: Doe stag fawn duck drake duckling goose gander gosling hen job cygnet hen rooster chick (or chicken) nanny goat dairy goat kid ewe lamb (and) sow boar, stag, mare, stallion, foal, cow, bull, calf

please continue overleaf

Note:

The Master for Agriculture using this chart as a guide can draw up similar

exercises. — Editor

VEGETABLES

Growing of vegetable in the dry season entails much labour but the suffering is nothing when compared with the profit made from the harvest. Why is this so? Does this mean that dry season garden produces more vegetables than the rainy season garden?

The answer is "No." It is an accepted economic fact that "when the demand is higher than the supply, there is a sharp rise in price" and this is truly portrayed in dry season gardening. For the reasons mentioned below, we cannot easily avoid the demand being higher than the supply.

FACTORS GOVERNING DRY SEASON GARDENING

Certain factors limit the establishment of a dry season garden. Most important among them is lack of adequate water supply. Shortage of water in a vegetable crop will result in a low yield, poor quality of leaves and fruits, even the plant may wither.

This makes it very necessary to acquire a suitable site near a water supply. This may be by a stream, a pond, a well, a river, a dam or even a pipe borne water from where it could be drawn. A second limiting factor is lack of a suitable land close to both a water source and a market or at least a motorable road.

I am confident that all secondary schools in the country have very good roads, so schools may not be perturbed by the second factor: unless your school is far from a water course. A school may be lucky to acquire a garden site near a water course, but the venture may not be a profitable one if the water course is very far from a market or motorable road.

— A Special Correspondent

While making a choice for site, it is very necessary to remember that an extra profit awaits you if your water course is close to a market.

A third factor is limitation of funds because a dry season garden needs more attention than the rain season garden. This is especially so before December when most people make a final struggle to raise fund for Xmas and New Year celebrations.

CONTENT

There are several types of vegetables. But in order to succeed, certain conditions must be examined before we make a final selection of the vegetable we plant. Some local vegetables are more in demand than others.

It is not, however, out of place if our choice of vegetables includes the common species of the African Spinach (*Amaranthus*), onions (*Allium Cepa*) Tomato (*Lycopersicum* tamuter), Chillies (*Capsicum annum*), Sun hemp (*Crotalaria junecea*) and Okro, etc.

Where you have a good European population in your vicinity, the inclusion of the following may be very profitable: Cabbage (*Brassica-Oleracea*), Carrot (*Danceos Carota*), Lettuce, Leek, beet root, radish, and so on.

TIME

The period, October/March is generally dry and it is necessary for us to start our gardening from the onset of the dry season say - 2nd week in October, or a little before or after this week. The first cultural operation is clearing, followed immediately by bed-making. The bigger the size of the garden, the earlier one starts work but a square chain-sized garden is considered fair for a school.

It is even better to be of a commercial scale since if it is well cared for, the proceeds will be fantastic. Some garden plants need nursery attention, e.g. Tomato; lettuce, onion, pepper, etc. while okro does not.

We shall have to transplant those that need nursery attention into nursery beds and sow the others direct into permanent beds. For a little illustration, we shall consider the cultural operations in one of the above mentioned crops - the *Lycopersicum tamuter*.

TOMATO (LYCOPERSICUM TAMUTER)

Variety There are many species of tomato. Prominent among them are - the "dwarf gem," the "Zub-rungu" the "Bony best," the "Pak," the "money maker," the "Valiant," etc.

The difference between a variety and another may be in the size of the plants, the size of the produced fruits, resistance to diseases.

palatability, ability to grow well with very little water, etc.

We learnt from our biology class that trees shed their leaves in the dry season in order to help conserve water which carries its food till the rain comes. We shall, therefore, consider the size of the plant (tree) before making a final choice.

The "Zuarungu" makes a big tree, the same thing with "Valiant" and the "Pak". The "dwarf gem," as the name implies is "dwarfish" in size with small sized leaves.

Its food consumption rate is considerably lower than the others. It thus, suggests that this variety is ideal for dry season cropping.

NURSERY

Make beds of 4' x 25', plant your seeds in rows along the beds - 6" apart from one row to another. Cover with grass and allow 5 days to germinate.

Remove your grass on the 5th day to avoid disfiguring your young seedlings. Water in the morning every other day.

On the air in POLAND

FARMING BY T.V

— A Foreign Correspondent

The TV Technical Farming School not only helps to increase knowledge on a particular subject, this being true of all TV school programmes, but it is also possible to obtain from it a secondary school certificate which is just as valid as any other secondary farming school certificate. This type of extra-mural tuition is an entirely novel and unique experiment which has emerged so as to meet certain domestic demands.

One of these demands is the giving of good specialized education to people who are to settle down to farming and in future run a farm on their own. And to run a farm involves developing it, rationally making use of all it offers, and also improving and modernizing it. This is why it is so important for farming knowledge to reach the most distant parts of the country.

The students of the Television Technical Farming School number about 15,000 and this figure embraces only those who are formally registered at the local correspondence technical farming schools where they will take all their end-of-term examinations.

The TV Technical Farming School students are mainly young people, round about 25 years old, who seem to have made up their minds about what they really want. And this is the best guarantee of their diligence.

They gather in Young Farmer's, Ruch and other clubs, in schools, and everywhere else where a television set is provided. They also follow

the lectures in their own homes, but this method is considered as a last resort by experienced pedagogues.

Self-education - the basis of the TV experiment - is a difficult skill to master. It can be made more efficient with an exchange of views, discussions, the immediate explanation of doubts, which is possible only in a group. This is why the School founders and organizers continually stress the necessity of forming discussion groups, however small they may be.

The methods of the TV Technical Farming School, the new ways of educating have not yet been fully worked out: it is in practice that new formats will evolve and in the course of time, bring about changes in this unique School. Now a special team is touring the country and making inquiries on the effectiveness of the TV secondary school programmes. Even before they finish their work, one thing can be stated with certainty: systematic work is an indispensable factor guaranteeing success in the TV Technical Farming School.

And this is the reason why the organizers have introduced the so called "guide-notebooks". Every student is provided with such a book, and in it there are blank spaces where homework is to be filled in. These books, properly completed, are one of the conditions for taking each examination. It also allows the teachers to learn something about the student's individual work.

TRANSPLANTING

After four weeks i.e. when most of your tomato seedlings would have attained the height of 4", prepare your permanent beds 4' x 25'. Manure them properly and transplant, spacing distance - 24" x 12" - i.e. one foot along the rows by 2 feet avenue.

MULCHING

Mulching is the art of spreading some grass or leaves on top of a bed or ridge as protection for roots of plants. It has two advantages:

- (1) It conserves water in the soil so that the plants are not parched.
- (2) The mulching material serves as manure when it is completely decomposed. It is thus very essential for us to mulch our permanent bed crops.

WATERING

When there is no rain there is need to water our bed - using a watering can, 3-4 gallons of water per bed will suffice. This should be done one in two days, usually between 6 and 9 a m

please turn over

VEGETABLES

FERTILISER

As far as possible, organic manure should be used in fertilising your garden. But when there is no adequate supply of manure, application of a garden fertiliser like the Shell "Totafert" and the like serve.

MARKET

Before three months from the date your nursery was established, you will see that your plant is producing fruits. The best method of harvesting is to pluck every morning and evening. When a good quantity is collected, you sell and get money in bulk.

CONCLUSION

Principals of schools should therefore encourage the practice of Agriculture if they really want to produce useful youths for our country. To achieve this a portion of land should be set aside for farming and vegetable gardening.

WEST AFRICAN SCHOOL CERTIFICATE & G.C.E SYLLABUS

AGRICULTURAL SCIENCE (ORDINARY LEVEL)

Candidates can be accepted for this subject only in accordance with regulations G.4(2), 4(3) and 5(3).

G. 4(2)

The Science syllabuses have been prepared on the assumption that the course will be based on practical work, and considerable weight is given, in the marking schemes, to the practical examinations. In order to ensure that passes in Science subjects are not awarded to students whose knowledge is obtained from books alone, no school may enter candidates in any Science subject unless it has been specifically recognized for that subject by the appropriate Ministry of Education. The Council reserves the right to inspect such schools. The Council does not attempt to prescribe a course of experimental work or even the number of periods to be spent in carrying out experiments since it does not wish to interfere with the freedom of schools in these matters. Candidates who have left school not more than a year before the date of the examination may be permitted by the Head of the school, at his discretion, to enter as school candidates.

4(3)

Schools seeking recognition for a specific Science subject (or subjects) must apply to the appropriate Ministry of Education for such recognition by 30 June, two years before the examination for which recognition is sought.

AND 5(3)

Private candidates can be accepted for Agricultural Science, Biology, Chemistry, General Science, General Science (Additional) and Physics only

if (i) they have spent three years at a school recognized for these subjects, and (ii) they produce, when they enter a certificate from the Head of their former school establishing this fact and stating that the Head is prepared to offer laboratory facilities during the examination.

Candidates offering Agricultural Science will be required to offer, in addition, General Science or Biology and Chemistry.

When Agricultural Science is taken together with General Science or Biology and Chemistry at the same examination, a pass may be awarded in Agricultural Science irrespective of the candidate's performance in General Science or Biology and Chemistry.

There will be three papers all of which must be taken

PAPER 1 will be a 1½ hour practical paper.

PAPER 2 will be a 1 hour theory (objective) paper.

PAPER 3 will be a 2 hour written paper consisting of four sections.

There will be three questions in section A two in each of the remaining three sections B, C & D.

Practical work should form the basis of preparing for this subject. Candidates will be required to submit their PRACTICAL FIELD NOTEBOOKS for which marks will be awarded.

DETAILED SYLLABUS

Candidates will be expected to answer questions on the topics set out in the column headed 'Syllabus'. The rates are intended to indicate the scope of the questions which will be set but are not to be considered as an exhaustive list of limitations and illustrations.

In order to help students preparing for examinations in Agriculture, we publish below this year's syllabus for the West African School Certificate at both Ordinary and Advance Levels.

It is desirable that schools presenting candidates for Agricultural Science should keep a School Farm, but where this is not possible, a well planned garden with small plots of farm crops of regular observation during growth is essential. At least two species of livestock, preferably one monogastric e.g. pigs, poultry, and one ruminant e.g., sheep, goat, cattle or a herbivore e.g. rabbit, guinea-pigs must be kept. The Practical Field Note Books of the candidates should contain records of individual projects, farm activities and observations carried out on the school farm or garden.

It is also recommended that the study of Agricultural Science in the School Campus be supplemented by visits to well organized farms and/or Agricultural Research Stations.

SECTION A: INTRODUCTION TO AGRICULTURE

SYLLABUS

1. The meaning and importance of Agriculture.

This should involve a discussion of the importance of Agriculture to man generally and its role in the economy of the relevant West African country, emphasizing that agriculture is a business.

2. General principles of land use.

This should be discussed in relation to the use of land for Agriculture, Forestry and wild life conservation purposes, bearing in mind the physical, economic and social factors, commercialisation, communication and marketing.

3. Agricultural Systems: land tenure problems; shifting cultivation; crop rotation; continuous cropping; monocropping, mixed-cropping, pastoral and mixed farming.

4. Development of Agriculture: role of science and technology in development of Agriculture, including tools and source of farm power, Problems of development of local Agriculture.

Role of Government-Agricultural policies, regulations and programmes. Agricultural education, research and extension, credit facilities, subsidies, quarantine, vaccines and farm settlement schemes.

5. Simple farm tools and Agricultural machinery: their uses and maintenance.

Engineering details should be avoided.

6. An elementary study of climate with particular reference to its effects on Agriculture. The main types and ecological distribution of crops (cereals, legumes, roots, vegetables, edible fruits; beverages, spices, drugs, oils, gums, latex, fibre) and animals (cattle, sheep, poultry, rabbits) found in West African countries.

7. Use of Agricultural and Forest products and their by-products.

The discussion should include the use of agricultural and forest products for the provision of

- (1) Food: fresh and processed;
- (2) Clothing: hides and skins, fibre, rubber etc.,
- (3) Shelter: Timber, gums, resins, etc.
- (4) Health: Drugs;
- (5) Fuel and Power: oil, minerals; and
- (6) Others.

SECTION B: SOIL SCIENCE

1. Soil formation and properties: rocks-main types, rock weathering and factors of soil formation. Composition and properties of the soil: sand, silt, clay, organic matter, soil acidity. Soil texture and structure, and their importance. Water-retaining properties of humus and clay.

Different soil types should be handled and the separation of a soil into sand, silt and clay fractions demonstrated. Water-holding capacity and drainage of a sandy soil, clay and soil with a high percentage of organic matter should be simply demonstrated by these soils in funnels.

2. Soil and water conservation: depletion of soil resources by leaching, cropping, burning and oxidation of organic matter; erosion—its importance, causes, prevention and control—irrigation and drainage.

3. Soil fertility: plant nutrients; major sources of nitrogen, phosphorus and potassium. Maintenance of soil fertility, crop rotations, including cover crops and green manure; the living population of the soil and

its role in the carbon cycle (especially Earth-worm and Termite) and nitrogen cycle (especially nitrogen fixing bacteria); the use of commercial fertilizers and lime; the principles and practice of cultivation and their effects on soils.

SECTION C: CROP SCIENCE

1. A review (with emphasis on their Agricultural implications) of plant parts, their functions, growth, development and reproduction.

2. Annual and perennial crop plants: external morphology, life-history, propagation, growth, cultivation, harvesting, storage, marketing and uses of local crop plants. Minimum of two

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crops from each of groups 1 to 6 should be selected from the list in the Appendix table below.

Where there are two or more types in each group not more than one member of each type should be studied.

3. Pastures and forage crops, recognition and study of main grasses and legumè species commonly used in pastures. Natural pastures and their distribution. Important forage grasses and legumes and their uses.

Detailed botanical studies are not required. Students will be expected to recognize on the basis of gross morphological appearance, at most for species of grasses and at least one species of legume used in pastures.

4. Crop improvement: aims, methods, introduction, selection and cross-breeding.

Chromosomes and Mendel's 'Laws' need not be treated in detail. A brief study of sexual and asexual methods of crop improvement. A comparison of a local variety and an improved variety of a crop plant can be made for demonstration.

5. Weeds: their importance in Agriculture. Recognition a common annual and perennial weeds of local importance. Methods of dispersal and control of weeds.

Herbicides can be mentioned but not details of chemical structure and mode of physiological action should be dealt with.

6. Disease: a simple general account of diseases caused by fungi, bacteria, nematodes and viruses and nutrient deficiencies affecting crops. The nature of the damage, methods of transmission and common methods of control.

Microscopic recognition of the causal organisms may be demonstrated where feasible.

7. Pests: a general account of pests of crop plants and stored products, their types and importance; principles and methods of pest control.

Study should include a general account of pests including rodents, birds and insects. An account should also be given of the life-cycle of a biting insect, e.g. grasshopper, a boring insect, e.g. a weevil, a sucking insect, e.g. an aphid.

SECTION D: ANIMAL SCIENCE

1. A review (with emphasis on the Agriculture implications) of the organs and tissue of animals and their functions.

A discussion of various species of domestic animals, their uses, and the common breeds (exotic and local) of each of the species.

2. Farm Animals: purposes of their production. Types and economic value of domestic animals locally produced

3. Elementary study of Animal Nutrition: Functions of carbohydrates, fats, proteins, minerals and vitamins. Feeding stuffs—sources of main nutrients; balanced rations, maintenance and production rations, malnutrition in farm animals.

Details of formulation of diets and bio-chemical details of these major nutrients are not required.

4. Reproduction in farm animals; heat period (oestrus), a general outline of the development, nourishment, respiration and birth of the young. Mammary glands; milk, lactation; egg formation; weaning of young.

Details of cell division and of the anatomy of the early embryo and the formation of the foetal membranes are not required.

5. Study of one animal from each of the following groups; study including the main aspects of general management, feeding and breeding.

- cattle, sheep and goats.
- pigs, rats, and dogs.
- rabbits, guinea-pigs, horses donkeys;
- chicken, ducks, turkey, guinea-fowl.

6. Animal improvement: aims, methods: introduction, selection and cross-breeding (including the use of artificial insemination).

Chromosomes and Mendel's 'Laws' need not be treated in detail. Comparison of a local breed and an improved breed of animal can be made for demonstration purposes.

7. Diseases: a general account of important diseases in farm animals. Control: preventive and remedial measures.

Local examples should be emphasized.

8. Pests and parasites: insects and ticks and carriers of disease in farm animals. Life-history of one endoparasite of farm animals, e.g. ticks or lice. The principles and methods of control of pests and parasites of farm animals.

Details of structure are not required.

APPENDIX TABLE

List of annual and perennial crops (See SECTION C. 1.2 of Syllabus).

- Group 1: Cereals: maize, millet, rice, guinea corn, wheat, tamba, acha.
- Group 2: Legumes: beans, cow peas, groundnuts, soyab beans, bambaragroundnuts, yard beans, pigeon pea.
- Group 3: Roots, tubers and vegetables: cassava, yams, coco yams, potatoes, onion, chariots, pumpkins, tomato, carrots, okro, spinach, vegetable jute, lettuce, cabbage, cauliflower.
- Group 4: Edible fruits and nuts: avocado pear; bananas

citrus fruits, guavas, mango, jackfruit, pawpaw, pineapple, cashew, water-melon.

Group 5: Beverages, spices and drugs: cocoa, coffee, colanut, peppers, benni-seed, ginger, sugar-cane.

Group 6: Oils, latex and fibres: coconut, cotton, oil palm, shea butter sun-flower, sesame, rubber, sisal, kapok, jute, hemp.

PRACTICAL AGRICULTURAL SCIENCE

One hour and a half will be allowed for the practical test which can be taken in an ordinary classroom. The principal aim will be to test skill in observation and recognition. The practical note book covering the work of the entire syllabus, field work farm diary and project work will be examined and assessed.

NOTE: It is assumed that candidates will have gained adequate experience of every practical aspect of the entire syllabus.

1. Soil samples, rocks, and fertilizers.

Soil samples to be examined for texture by feel only, acidity by simple tests. Common rock types of igneous, metamorphic and sedimentary origin. Soil profile description. Recognition of common types of fertilizers and manures.

2. Growth, habitat and form of plants and animals studied as listed in Appendix Table (Groups 1 to 6) and sub-section 5 of Section D of the syllabus.

Recognition of parts and whole of the crop plants and farm animals studied.

3. Main pests and diseases of crops.

Recognition of main pests, their damage to crops, e.g. cotton stainer stem borers of cereals, weevils of grains and yam beetle. Recognition of main diseases of crops and their casual agents where feasible with characteristic symptoms, e.g. smut of cereals, maize rust, scollen shoot of cocoa, mosaic of cassava rasette and leaf-spot of groundnut, blast of

rice and brown-rot of pineapple, nematodes of crops, parasitic seed bearing plants such as dodder and mistletoe, and nutrient deficiency symptoms.

4. Seeds, fruits, food storage organs and other parts of the main plants and local weeds.

Recognition of the structure of seeds and fruits of the main crop plants and of weeds in relation to the mode of their dispersal.

5. Tools

Recognition of common hand tools, e.g. cutlasses, hoes, forks, mattock, trowels, rakes, budding knives, shears, secateurs, chain measurer, sprayer etc. and their uses and maintenance.

6. Animal feed-stuffs.

Recognition and comments on the use of main animal feed-stuffs, e.g. palm kernel meal, blood meal, bone meal, maize, guinea corn, groundnut cake, fish meal and common forage crops, e.g. guinea grass, elephant grass, giant star grass, andropogon, calopogonium, pueraria, centrosema and stylosanthis.

7. Main pests and parasites of farm animals.

Recognition of main ectoparasites and endoparasites of animals, e.g. ticks, lice, tape-worms and round-worms, recognition of ill-health symptoms.

AGRICULTURAL SCIENCE (ADVANCE LEVEL)

The syllabus that follows has been designed to portray Agricultural Science as an applied science with emphasis not only on the depth of but also in the acquisition of skills that are associated with the theory. It is therefore essential that candidates should make field trips to farms in different ecological areas and game reserves within the country, and

in different ecological areas and game reserves within the country, and should be exposed to the major products of the forest types in their country.

The syllabus has been designed to meet the needs of private candidates as well as those of school candidates. Candidates who wish to do a University course in Agricultural Science are advised to offer along with this subject at Advanced Level some other science subjects as may be necessary for entry requirements of the Universities.

It is desirable that candidates should have reached Ordinary Level standard in at least one of the following subjects:

Agricultural Science, Biology, Chemistry, Physics, General Science and Additional General Science.

The examination shall consist of three papers all of which should be taken.

PAPER 1

2 - hour theory paper divided into three sections.

Section I: General Agriculture (5 questions).

Section II: Agricultural Economics (3 questions).

Candidates shall be required to answer four questions including at least two from Section I and at least one from Section II.

PAPER 2

3 - hour theory paper divided into three sections.

Section I: Soil Science (4 questions).

Section II: Crop Science (4 questions).

Section III: Animal Science (4 questions).

Candidates shall be required to answer two questions from each section.

PAPER 3 (Practicals)

A Farm Project to be assessed in the second term of the year of examination.

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nation; and carrying 1/3 of the maximum marks for the practicals.

PLUS a 3-hour practical paper.

- Note: (1) The content of the syllabus for the Practicals could be examined in the theory papers and vice-versa.
- (2) Paper 2 alone may be offered as a Subsidiary Paper for H.S.C.
- (3) Farm Project

The Farm Project would be assessed by an examiner of the Council. The Project Work would be inspected in the 1st term of the 2nd year or when the Project is at its peak. Schools will therefore be required to inform the Council of the Project Work being carried out by the students at the end of their first year.

DETAILED SYLLABUS

A. General Agriculture

1. Introduction

- (a) Meaning and importance of Agriculture.
- (b) Factors that determine the pattern of agriculture-ecological and sociological basis: ecological distribution of crops, animals and forests.
- (c) Agricultural systems: principles and practice of cultivation nomadism, shifting cultivation, mixed cropping, crop rotation and mixed farming.
- (d) The contributions of Agriculture to the national economy.

2. Development of Agriculture

- (a) Problems of subsistence agriculture-land tenure, education, health services, communications, soil erosion, transpor-

tation, attitudes, poor tools, government agricultural policies.

- (b) General World Survey of the development of Agriculture with special reference to West Africa.
- (c) Role of Science and Technology in the development of Agriculture.
- (d) Administration of agricultural production and the role of government-agricultural policy, research, extension education and services,

education and services, financial assistance to farmers, veterinary services and quarantine services.

3. Land Tenure System and the Principles of Land use for Agriculture, Forestry and Wild Life Conservation.

Factors affecting land use-topography, economic and social factors, population, situation of land for commercialisation, farm settlement schemes, development, management and conservation of forests and soils.

4. Fisheries

Distant sea, coastal and

Distant sea, coastal and inland water fishing, fish ponds curing, handling and distribution of fish. Marine products other than fish.

Note: Fish species to be mentioned Fishing equipment to be discussed.

5. Agricultural Engineering and Surveying

- (a) Problems and prospects of mechanization of agriculture in West Africa.
- (b) Tools, implements and machineries-uses, care and maintenance.

(c) Sources of power on the farm-wind, water, electricity, heat engines and animals.

Brief discussion on the working of the internal combustion engine.

(d) Farm surveying farm buildings and constructions (simply treated).

(e) Mechanization peasant agriculture.

B. Soil Science

1. Genesis and Classification of Soil

(a) Rocks and minerals-their characteristics and simple classification.

(b) Weathering Processes

(i) Expansion and abrasion agents, water, wind and temperature.

(ii) Chemical Processes

Hydrolysis, hydration, oxidation, solution and reduction.

(iii) Biological Processes: Effects of organisms.

(c) Soil Formation

(i) Factors of soil formation-climate and vegetation, relief and drainage, parent material, living organisms, time.

(ii) Soil profile-soil horizon, soil profile defined: Genetic horizons of ideal profile specific to the area. Importance to Agriculture.

(d) (i) Principles of soil classification.

(ii) Kinds of soils in the local area and their existing classification.

2. Composition of the Soil

(a) (i) Physical composition of the soil: soil components, soil structure, soil texture, soil air, soil water and soil temperature.

(ii) Mineral composition of the soil; Quartz, feldspars, micas, clay minerals, montmorillonite etc., colloids and colloidal systems, colloids defined, properties state of colloidal system soil, gel.

(iii) Organic components of soil-organic material, substance and matter; humus.

B. Effect of Soil composition on properties of the soil.

3. Soil Fertility

(a) Plant Nutrient Elements

(i) Classification Macro-N,P,K,Ca, Mg,S
Micro-B,Cu,Zn,Mn, Co,Fe,Mn.

(ii) Factors leading to loss of these nutrients: Leaching, erosion, crop removal, etc.

(iii) Replenishment of lost nutrients: Soil organisms: Micro-Marco-, effect of soil organisms on the soil, Nitrogen cycle; and carbon cycle; rock weathering, fertilizers.

(iv) Soil management as an attempt to strike a balance between loss and gains in soil nutrients.

4. Soil Conservation

(a) Types of irrigation and drainage.

(b) Soil erosion: Types, effects and control.

(c) Methods of soil conservation: terracing, contour farming, strip cropping, cover crops, mulching, etc.

(d) Water pollution and recovery (where it applied).

C. CROP SCIENCE

Candidates should be familiar with agricultural and botanical methods of classification of crops

methods of classification of crops as well as the identification, morphology and reproduction of important crop plants.

1. INTRODUCTION

Origin and geographical distribution of some important tropical crops including forage crops. Nomenclature and classification of crop

ture and classification of crop plants. Examples should be drawn from the major classes of locally cultivated crops.

2. FACTORS AFFECTING CROP PRODUCTION

Ecological physiology of crop plants: the primary effects of light, radiation, temperature, water and inorganic elements on crop growth, development and yield.

3. PRINCIPLES OF CROP PRODUCTION

Land preparation.

Methods of propagation: seed selection and testing, vegetative propagation. Nursery practises: time of planting and planting distances.

4. PRINCIPLES OF PLANT BREEDING AND CROP IMPROVEMENT

(a) Aims of crop improvement;

(b) Basic genetic principles of crop improvement;

(c) Methods of crop improvement: Introduction and mass selection; hybridisation; multiplication; vegetative propagation.

5. PRINCIPLES OF PLANT PROTECTION

(a) Diseases of crop plants: Causal agents, symptoms, methods of transmission and eradication of diseases associated with the crops studied.

(b) CROP PESTS

(i) Classification of field and storage pests; extent of damages: e.g. insect pests, nematodes, rodents, birds and human beings.

(ii) Principles of pest control: mechanical, biological, cultural and chemical.

(c) WEEDS AND THEIR CONTROL

(i) Identification of common weeds and modes of dispersal; study of selected weeds with particular reference to locality.

(ii) Control: mechanical, biological, cultural and chemical methods.

6. STUDY OF SELECTED CROPS

Origin, geographical distribution; climatic and soil requirements; cultural practices, harvesting, processing marketing and storage of West African arable crops, cash crops and vegetative crops.

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The study should include at least one cereal from group 1, one legume from group 2, and four plants chosen from at least three of groups 3,4,5 and 6 below:-

GROUP 1

CEREALS

Maize-Zea mays.

Millets-Pennisetum typhoides, Setaria italica, Eleusine corocana

Rice-Cryza sativa

Guinea Corn-Sorghum bicolor (S. vulgare)

Wheat-Triticum vulgare

Tamba

Acha

GROUP II

Beans-Phaseolus spp

Cow peas-Vigna unguiculata

Groundnut-Arachis hypogea

Soya Beans-Gycine soja

Bambara groundnut-Voandzeia geocarpa (V.Subterranea)

Yam bean-Sphenostylis steno-carpa

Pigeon pea-Cajanus cajan

GROUP III

Cassava-Manihot esculenta

Yams-Dioscorea Spp

Cocoyams-Araceae (Colocasia or Xanthosoma)

Potatoes (European P)-Solanum tuberosum (Hausa P.)-Plectranthus esculentus

Sweet Potatoes-Ipomoea batatas

Onions-Allium cepa

Shallot-Allium ascalonicum

Pumpkins-Cucurbita maxima

Tomatoes-Lycopersicum esculentum

Pumpkins-Cucurbita maxima

Tomatoes-Lycopersicum esculentum

Carrots-Daucus carota

Cabbage-Brassica oleracea

Cauliflower-Brassica oleracea, var. botrytis.

Graden egg-Solanum melogena

GROUP IV

Avocado pear-Persa gratissima

Bananas-Musa Spp

Citrus-Citrus Spp.

Guava-Psidium guajava

Mango-Mangifera indica

Pawpaw-Carica Papaya

Pine-apple-Ananas sativus

Cashew-Anacardium occidentale

Water melon-Colocynthis citullus

GROUP V

Cocoa-Theobroma cacao

Coffee-Coffea Spp.

Colanut-Cola Spp.

Benniseed-Same as Sesame

Ginger-Zingiber officinale

Sugar cane-Saccharum officinarum

Peppers-Piper nigrum*

GROUP VI

Coconut-Cocos nucifera

Oil Palm-Elaeis guineense

Cotton-Gossypium Spp

Shea-butter-Butyrospermum park ii

Sunflower-Helianthus annuus

Sesame-Sesamum orientale

Rubber-Hevea brasibensis

Sisal hemp.-Agave Spp.

Kapok-Ceiba pentandra

Kenaf.

Urena lobata.

7. PASTURES AND FORAGE

Pasture agronomy, grasses, legumes, their distribution, improvement, quality and assessment, establishment and conservation.

D. ANIMAL SCIENCE

1. Introduction

Role of livestock and livestock products in West African countries.

2 FARM ANIMALS

Types and classification of locally available breeds of cattle, sheep, goats, swine, poultry.

3. ANATOMY AND PHYSIOLOGY

- Brief gross anatomy of named domestic animals: cattle, goats, horses, pigs, sheep, rabbits, poultry and fish.
- Physiology of digestion, reproduction, lactation, milk let down, egg formation and laying, circulatory, and endocrine systems.
- Environmental physiology: The direct and indirect effects of climate (tropical) on farm animals with due regard to their effects on grazing habits, growth, reproduction, milk production, egg production, gross yield and quality of food supply.

4. ANIMAL NUTRITION

- The main nutrients—carbohydrates, proteins, fats, minerals, vitamins, water—their chemical composition and their role in animal nutrition. Malnutrition in farm animals.
- Feeds and feeding—preparation of foodstuff animals—cooking, cutting, pelleting etc.

Note: Emphasis should be laid upon the reason for feeding these forms of feeds to the different types of animals.

- Principles of ration formulation—balanced maintenance, production, starter rations.

Note: Mathematical and technical details of ration formulation will not be required.

5. ANIMAL HEALTH

(a) DISEASE

Causes and prevention; pest and parasite control; insects and ticks as carriers of diseases in farm animals. Life history of one endoparasite of farm animal (e.g. liverfluke, roundworm, tape worm, trypanosomes); and one ectoparasite (e.g. ticks and lice).

- Diseases as the limiting factor in the development of animal

continue on p.20



NEPA



Rural Electrification Projects being carried out by National Electric Power Authority will promote mechanised farming and increase productivity and improve standard of living in the rural areas.



**NATIONAL ELECTRIC
POWER AUTHORITY**