FB:Indian Administrative Service(Raz Kr)

GS Paper III - Science & Technology

Recent developments on GM crops

Imp. bodies:

→ GEAC (Genetic Engg. Appraval committee) – MOEF

→ RCGM (Review Committee on Genetic Manipulation) – dept. of biotechnology

→ There is no long term assessment in case of GM crop variety

→ SC constituted technical Exam. committee – it will see whether GM crops to be introduced or not. In oct 2012 it recommended a moratorium on GM crops' (open field trial for 10 years. Not yet accepted. SC is yet to come with its verdict

→ Standing committee's on agriculture – also against the GM crops.

→ In India Mahyco is the licencee of monsanto

→ In case of Bt cotton

Before
India – Net importer

after
Net exporter
Pestiside usage ↓
income of farmer ↑
Yield ↑

→ Biotechnology Regulatory Authority of India (BRAI) Bill is tabled in the parliament. Single window Agency, will replace GEAC, RCGM

→ GEAC recomm. to state govt. are not binding

It gave approval to:

GM Maize
" Rice
" Wheat
" Castor
" Cotton

BAYER Bioscience (→ Germany is)
SYNGENTA → Switzerland } are other GM Companies
Dupont - USA

Constraints of Indian agri:

→ Food & Nutritional security
→ temp. sensitive crops e.g. wheat, 1°c can destroy million of hect. of wheat
→ Yield
→ Regional varieties.

There must be a judicious blend of traditional → transgenic varieties.

Approval of field trial of GM crops by GEAC

The Genetic Engg. Appraisal Committee under MOEF has cleared field trials for GM wheat, ~~rice~~ Maize, ~~etc~~ castor and Cotton for the Kharif season 2013. Bayer Bioscience Ltd. has got open ended Clearance to test GM rice in all 4 regions of the country. The open ended clearance will allow the Company to carry out the tests wherever it can convince the state govts.

A final nod from state govt. is mandatory for field trials. Maharashtra Hybrid seed Company (MAHYCO), the mumbai based licencee of Monsanto has got clearance for GM Maize, okra and wheat. the Hyderabad based Directorate of oilseeds Research GM Castor field test have been approved. these clearance come while the Biotech. Regulatory Authority of India (BRAI) Bill is pending before the Standing Committee of parliament and the SC is yet to pass a verdict in a case challenging the existing regulatory mechanism for GM crops in the country.

Scientific Advisory Council on Biotech. & Agri. to the PM of India

It has recommended a judicious blend of traditional farming and new technologies like GM crops to ensure food and nutrition security. the members of scientific advisory council emphasise that the current debate on GM crops is demoralising and isolating Indian scientist in the sector where skills have been built with pain staking efforts & large investment. some of the opposition to

GM crops in the country results from fear of domination of MNCs. one way to address this concern is to invigorate and further strengthen the relevant scientific capacities of our institutions in public sector, Universities and India Companies. the members mentioned that land availability and quality, water low productivity, salinity & drought, post harvest losses are all serious concerns that will endanger Countries' food and nutrition security with potentially serious additional effects as a result of climate change. Accordingly strategies for agri. in future must be based on higher yields along with reduction in resource inputs. This will require a judicious blend of traditional breeding and new technologies, both non-transgenic and transgenic.

new strategy is not to eliminate the use of traditional hybrid varieties but judicious blending.

INDIGENIZATION OF TECHNOLOGY

Tryin to infuse local ideas, traditions etc

e.g. we developing IRNSS in comparison to GPS, GLONASS etc.

→ Indigenization gave self reliance

Health & Medicine

example of innovation

① 1st issue is development of vaccines
e.g. Hepatitis B vaccines earlier we used to import from U.S., but was costly, so we decide to develop it indegenously, by Serum Institute, Pune by Recombinant technology, cost was slashed by 40%

② Development of Prosthetic leg Jaipur Foot - Brainchild of P.K. Sethi & Ram Chandra Sharma using Polyurethane, thermo setting plastic, water proof provided free of cost by Bhagwan Mahavir

③ ECG machines with slashing of 300% of its price.

① IT & Computer
→ Supercomputer
→ used in Missile
→ Pharma Research

India was denied CRAY XMP CRAY YMP

Indian → PARAM
PARAM YUVA II

② Renewable energy

The infusion of local ideas, values, symbols, aesthetics and procedures into an organisation so that it is thoroughly a product of local imaginations and aspirations.

this is called Indigenization. Indigenization bring it under the control, dominance or influence of local people. The Indigenization of technology provides, how a country can harness the benefits of inclusive innovations specially in areas such as healthcare, medicine energy, water and environment. The select innovations are to be processed with the help of industries. Inclusive innovations in healthcare sector has revolutionised the intervention of technology in medicine e.g. it helped reduce the cost of Hepatitis B vaccine by 40% and Artificial Foot by 300 times Jaipur Foot, the prosthetic leg, the brainchild of doctor P.K Sethi including R.C. Sharma. It has been designed to be inexpensive, water resistant and quicle to fit and manufacture it is made up of polyurethane which ↑es the durability and convinience of use. These examples substantiate that the objective is not to produce cheap & low quality product & services but to harness the power of S&T and creativity to invent quality products that can serve the MASSES.

e.g: Nanotechnology by using process of nanofiltration using nano ceramics

Energy security

Sustainable Energy

Solar Energy] > 5000 trillion kWH/annum. If we we recieve are able to use a fraction of it, our demand can be fulfilled.

Sustainable energy

↓ Renewable Energy

↓ Energy Efficiency

The tech used is Concentrated Solar power.

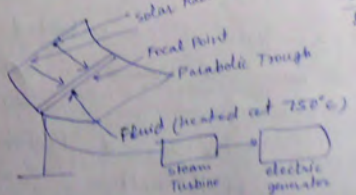
For this we use

↓ Concentrated solar thermal Energy

↓ Concentrated Solar Photo Voltaics → Here a group of solar cells called as solar panel is used

Indium Selenide

Solar Panel



GRID Power

off Grid → decentralising the power providing at the individual level.

Solar energy is the part of NAPCC → National Action Plan on Climate Change

→ 20000 MW by 2022
→ solar city? → check

Sustainable Energy

" " is the provision of energy that meets the needs of the present without compromising the ability of future generations to meet their needs. It has 2 key components which include:

① Renewable energy
② Energy efficiency

w.r.t. the growing demand for sustainable energy, concentrating solar power technologies are on the verge of large scale global deployment. These technologies harness concentrated sun light to generate electricity.

CSP tech. is a method by which dispersed sunlight is concentrated through the use of low cost mirrors to generate electricity. It is done in two ways:

① Concentrating solar thermal technology
② " photo voltaic "

CSP system use mirrors or lenses to concentrate a large area of sunlight or solar thermal energy onto a small area. Electric power is produced when the concentrated light is converted into heat which drives a heat engine i.e steam turbine connected to electric power generation. The Parabolic trough technology is currently the most proven CSP technology and therefore the most developed and standardised and currently existing plant produce 500 MW of electrical capacity. The parabolic disc shaped reflector concentrates sunlight into a reciever located at the focal point of the disc. The concentrated beam radiation is absorbed into a reciever to heat a fluid or gas to approx 750°C. This fluid or gas is used to generate electricity in a micro-turbine attached to a receiver.

In Conc. photo voltaics (CPV) the concentrated sun light is converted directly to electricity via the photo voltaic effect. The group of solar cells in the form of solar panel either made up of silicon or indium selenide help in this photo voltaic effect.

Govt. of India has identified solar power as an

imp. renewable energy source and its commitment to develop solar power is reflected in the NAPCC adopted in 2008 which contains one of the missions as Jawaharlal Nehru National solar Mission which was formally Lanched on Jan 11, 2010 by PM. This mission has set the ambitious target of deploying 20000MW of Grid Connected Solar power by 2022.

Solar City

Solar city aims at minimum 10% reduction in projected demand of Conventional energy at the end of 5 years through a Combination of enhancing supply from renewable energy sources in the city and energy efficiency measures being motivated by the local govt. to adopt renewable energy technology.

Biomass Power and Cogeneration

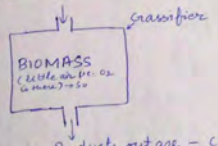
Biomass includes:
1) Bagasse - dried fibrous component
2) Rice Crop husk / straw
3) coconut shell
4) Groundnut shells
5) Cotton stalk
6) Coffee waste
7) Saw dust (wood chips)

Two thermo chemical processes:

① Grassification ← Combustion ← Biomass power

Biomass, heated with abundant O_2, then C elements produce $CO_2 + H_2O$ → run steam turbine

Grassification



Products out are – $CO + H_2$ + traces of CO_2 this Combination is also known as synthesis gas or SYN gas, also known as producer gas sometimes (but it also has N_2). This producer gas can run genset engines.

Genset are of 2 types

① Dual Mode - both diesel as well as producer gas can be used.
TERI brought such

② Genset which runs on producer gas only (100% producer gas is used).

In Indigenisation of tech. examples we can use biomass + cogeneration

Biomass power and Cogeneration Programme

India being a large agrarian economy biomass in the form of wood waste, agri & crop residue and animal dung is available in enormous quantities. 32% of total primary energy used

In the country still derived from biomass and more than 70% population depends upon it for its energy needs. Biomass materials used in powergeneration includes

Bagasse
Rice straw & husk
Cotton stalk
Coconut shells
Jute waste
Groundnut shells &
Saw Dust

Bagasse is the fibrous matter that remains after sugarcane stalks are crushed to extract their juice. The current availability of biomass in India is estimated 500 MMT/year. About 120-150 MMT correspond to a potential of about 18000 MW. About from this about 5000 MW additional power could be generated through bagasse based Cogeneration in the country with 550 sugar mills.

Technology

The thermochemical processes for conversion of biomass to useful products involve:

① Combustion &
② Grassification

Combustion is the burning or incineration of biomass using excess air or O_2 producing CO_2 and heat. The biomass being burnt in high pressure to generate steam and operating a turbine with generated steam. The net power cycle efficiency that can be achieved is about 25% the exhaust of the steam turbine can either be fully condensed to produce power or used for another useful heating activity. The latter mode is called cogeneration and this cogeneration route finds applications in industry.

Cogeneration in sugar Mills

Sugar industry has been traditionally practicing cogeneration by using bagasse as a fuel. With advancement in the tech. for generation and utilisation of steam at high temp. and pressure Sugar industry can produce electricity & steam for their own requirements e.g. if steam generation temp. & pressure is raised from 400°C & 33 bars to 485°C & 66 bars

more than 80 kwh of additional electricity can be produced for each tone of cane crushed. The sale of surplus power generated through optimum cogeneration would help a ~~sad~~ sugar mill to improve its viability apart from adding to the power generation capacity of the country.

Biomass gasification

is the conversion of biomass into synthesis or producer gas that can be used for producing electricity. G. is a thermo chemical process that converts carbon containing material such as biomass with little O_2 present at high temp into SYN gas containing mainly CO and H_2 and also traces of CO_2 when N_2 is also present along with these combinations, it is called producer gas.

locally available biomass resources like small wood chips, cotton stalks, rice husks and other agro residues are available to meet the unmet demand of electricity for lightening, powering pumps and even micro enterprise in villages. It reduces the use of fossil fuels in village including providing livelihood opportunities. The SYN produced can use to produce ammonia, urea that form the foundation of nitrogen based fertilisers. SYN can also be used to produce methanol. The producer gas generated in gassifier can be fed to energy gen-set for producing elec. energy. This electricity can be generated either dual fuel mode which could run both on producer gas or diesel where upto 70% diesel replacements are obtained while the other mode is the 100% producer gas mode such that electrical energy is now produced using no diesel at all and using only producer gas. Both these technologies on indigenisation has helped in promoting renewable energy and also energy efficiency which are the core components of sustainable energy.

12/07/13 S&T

Indigenisation of technology in Defence sector

65% of defence equipments, we import e.g. fighter planes, equipments, surveillance equipments

Buy Indian
Buy & Make "
Make "
Buy Global

In the recent 'Defence Procurement Procedure 2013' (DPP-2013)
Categorisation is:

Preference wise
(i) Buy (Indian)
(ii) Buy and Make (Indian)
(iii) Make (Indian)
(iv) Buy (Global)
Here justification has to be given

Constraints are: transfer of technology

HAL & BHEL → imp. PSUs in defence sector.

DRDO

KAVERI engines are type of Turbofan engines

In 1962 we do not have multirole combat aircraft i.e fighter bomber — it can also be used for reconnaissance mission also.

HF-24 Marut → completed 50 years and already decomissioned

In 1965 we obtained Mig-21 from Russia.
Earlier 874 Mig-21 Now 267, it was to be decomissioned in 1990s but India-Russia came out with Mig-BISON

SUKHOI-30 MKI → air superiority

About 65% of the defence equipments of India is bought from foreign vendors making India the world's biggest defence importer. Besides the dependence on foreign vendors, it is also the prime reason for the flourishing industry of illegal middleman in defence sector. The recent defence procurement procedure (DPP 2013) emphasises on indigenisation by strengthening the defence manufacturing base in the country and also making the procurement procedure more efficient. The 1st major change that has been brought in, relates to the introduction of the prefered Categorisation in the following order:

1. Buy (Indian)
2. Buy and Make (Indian)
3. Make (Indian)
4. Buy (Global)

while seeking the approval for accord of necessity in a particular Category like buy (global), it will now be necessary to give justification for not considering the other high preference categories. This is expected to give a stronger impetus to indigenisation. Besides this the requirement of prescribed indigenous content e.g. 30% in the buy Indian Category is to be achieved on the overall cost basis as well as in core component. Likewise in the buy and make (Indian) cases there is no stipulation regarding the minimum indigenous content in the buy component and the Indian vendor is given the room to achieve the prescribed Indigenous Component in the overall delivery. This enables Indian vendor the time to absorb transfer of tech., set of manufacturing facility while meeting the service requirements. So DPP-2013 Categorisation includes the process by which defence ministry chooses between various options such as buying equipment from & suppliers from abroad, buying from within the country, making them in country or importing tech. to make them within the country and thereby clearly favouring indigenisation. So the option of importing a piece of defence equipment should be exercised only after exhausting the option of buying from within.

The new DPP-2013 aims to balance the competing requirements of expediting capital procurement, developing robust indi. defence sector and conforming to the highest standards of transparency, probity and public accountability while laying a strong emphasis on promoting indigenisation and creating a level playing field for the Indian industry.

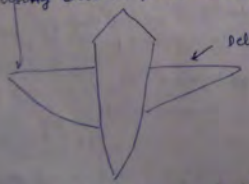
It would be difficult to follow this workable proposition given the state of our indigenious defence equipment manufacturing base. Some of DRDOs highest profile projects like the LCA have proved that indigenisation is not an easy proposition especially given the unwillingness of existing suppliers to share key technologies. Indeed accessing technology will be the biggest challenge for the development of indigenous defence manufacting.

The HAL based in Bangaloore is one of Asia's largest aerospace company. It is a state owned company

Involved in ~~assembling~~ Manufacturing and assembling aircraft. The German engineer Kurt Tanke along with HAL designed India's first fighter bomber aircraft HF-24-Marut ~~was~~ made in India (1961-1990) after the Indian govt. Conducted 1st nuclear test at Pokhran, international pressure prevented import of better engines leading to its early demise. But it played an important role during 1971 war battle of Longewala

Multirole Combat Aircraft
- Multimode radar → Surveillance detection
- Fly by wire → using the Auto Pilot Mode
- COMPOSITE Material → to make it lightweight, supersonic
- Tailless delta wing
- Turbofan Engine - efficiency in fuel and thrust generation

LCA - Tejas → started in 1983, may be inducted in 2015
HAL + ADA (Aeronautics Development Agency)
→ using Carbon fibres including KEVLAR



Stealth technology → undetected, Material used is such that it absorb EM waves of the enemy radar

GTRE → Gas Turbine Research Establishment

DASSAULT } Transfer of technology to HAL
RAFALE }
is will directly come from France while 108 will be Manufactured here.

AWACS

Tejas is a LCA indigenously developed by India it is tailless with pure delta wing configuration powered by a single engine. It is the second supersonic fighter bomber developed indigenously by HAL after the HAL MARUT. It integrates technology such as relaxed static Stability, Fly by wire flight control system, Multi Mode Radar and Composite Material (CM) structures. The CM includes Carbon Composites including Kevlar, steel which makes it heat resistant and lowers the weight by not using the Metallic frame there is 40% reduction in parts / Components including weight. Multimode radar's primary role is to detect and locate target, process the information, lock on the target and pass this input to the Mission Computer. From the Mission computer this information will be utilised by the pilot as he contemplates weapons release activity. 10 targets can be

tracked simultaneously. The high resolution synthetic aperture radar facilitates all weather employment of a variety of air to air, air to surface weaponery and is the primary targeting sensor on the Tejas. The digital fly by wire system of Tejas employs a powerful digital flight control computer to ease handling by pilot. The auto pilot provides pilot to do more head down activities especially mission critical activities without being concerned about the aircraft departing from its flight path. It helps during night flight, safe altitude recovery which automatically pulls up the aircraft if it comes too close to the ground. The delta wing keep Tejas small and light weight and also confers close combat and high speed.

The dream of fitting heavy engine being developed indi into home grown LCA Tejas has been shattered. Kaveri engine originally intended to power LCA was taken up by Banglore based Gas Turbine Research Establishment (GTRE) But DRDO lab not being fully able to overcome technical challenges and always developing snags. LCA will now have engines from (General Electric) GE, F-404 (IGA) It is already 3 decades in making and is likely to become fully combat worthy by the end of 2015. It is yet to attain initial operational clearance-2 being pushed to November this year and then it was to pass through final operational Clearance by the end of 2014. The aim of Tejas was to replace the aging mig-21 while Indian Air force continued to operate the upgraded version mig 21 - BISON until 2019. The supersonic fighter jet mig-21 which completed 50 years in service this April 2013 despite facing criticism following a substantial no. of accidents is likely to remain operational in its upgraded version until 2019. 2 years later than they were originally scheduled to be decomissioned. The airforce took the decision owing to delay in the commissioning of India's own Tejas LCA and the purchase of 126 Rafale fighters from France for which official contract is yet to be finalised. As of today out of 874 migs in 1964, 264 are still flying. It played an imp. role during the Indo-pak war 1971 and enabled India to field a formidable air force to counter

Chinese and pakistani threats. It overcome Pakistan's F-104 star fighter provided by U.S. in 1971. ATLANTIQUE incident in 1999 is associated with the 2 mig-21 aircrafts of IAF intercepted and shot down BREGUET ATLANTIQUE reconnissance aircraft of Pakistan Navy.

SUKHOI-SU-30MK1

is an air superiority fighter developed by Russia and assembled under licence by India's HAL or Indian Air Force. It is an All weather long Range Fighter. The first russian made SU-30 MK1 Came in 2002 while the first indigenously assembled SU-30-MK1 entered service with IAF in 2009. There are 157 SU-30 MK1 in service. It is expected to form the backbone of Indian IAF fighter fleet to 2021 and beyond. HAL expects that 100% indigenisation of SU-30 MK1 programme from the production of raw materials to the final plane assembling. It is also to integrate the supersonic cruise missile Brahmos with a range of about 290 kms. SU-30 MK1 has a range of 3000 kms with internal fuel ensuring 3.75 hours Combat mission.

Dassault Rafale

Dassault Rafale was one of the 6 multirole fighter aircraft which ~~one~~ on Jan 31, 2012 IAF announced as the preferred bidder in the competition. If the deal is signed, 18 of the 126 aircraft would be produced at Dassault Aviation Facilities in France, while remaining will be done at HAL facilities in Banglore under the transfer of tech agreement. The ministry has rejected any demands for changing the role of HAL in project saying that it will remain lead integrator of the programme as per the request for proposal issued for project. It has range 3700 km with speed of 1.8 mac

Airbourne Early warning and Control System AEW&CS

Airbourne warning and Control System AWACS

360° view but range is important in India is trying of for 400 km range

240° to 270° & 250 km range

India bought got 3 PHALCON AWACS in 2009 from Israel

India ~~have~~ is fitting mini AWACS in EMBRAER aircraft of Brazil

i.e. 270° not 360°

Dev. of AWACS and Ballistic Missile Defence Tech. that includes Intercepter Missiles provided with seekers

Exo atmospheric and Endo Atmospheric ballistic shield

Exo - range of intercepting and destroying is 60 km

Endo - is Prithvi based i.e. Prithvi Air Defence

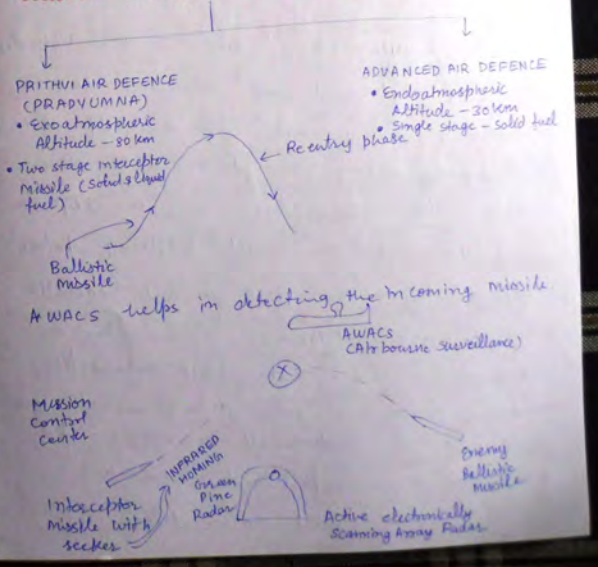
Air to Air Defence is endo atmospheric

Notes

AWACS Programme

India has just taken up the development of ₹6000 crore AWACS that will have the capability to penetrate longer distances enemy territory by way of radars and electronic warfare systems without venturing into the region physically. According to DRDO, they have just started the programme after clearance from the govt recently. AWACS is a heavier and high endurance system which can give coverage about 360° degrees as against the air borne and early warning ——— control which is about 240 to 270° coverage. In addition AWACS fly at higher altitude and it can penetrate into the enemy territory not physically but by way of radars and electronic warfare system to longer distances and it can be in sky for large distances besides giving better visibility. All over the world people have AEWACS & AWACS in a tandem mode. The 2 AEWACS aircraft would be ready for the IAF by implanting it into the Embraer aircraft while the AWACS will be implanted into the ILYUSHIN aircraft IL-76. India has already borrowed 3 PHALCON AWACS from Israel

Ballistic Missile Defence Programme



Seeker is used for accurate detection.

Brahmos is the "only" supersonic cruise missile with Russia & India

If stealthy technology - Ferrite is used (99% iron) in that case interceptor will not get the signal

DRDO has developed a 2000 km range advanced air defence.

Ballistic missile defence (BMD) is the technology developed and used for contacting the incoming enemy missiles with the help of interceptors either ground based or air based. The interceptors are usually designed to hit the target midway before the reentry phase. BMD or anti ballistic missile system (ABMS) is actually a defence shield that first identifies the incoming enemy missile with the help of its advanced surveillance capa. provided by specialised radar tech. In the 2nd step interceptors are released to hit the identified targets midway to restrain them from hitting their desired destination. This way the unacceptable damage that would otherwise occur can be prevented

India BMD

It is a two layered system consisting of two interceptor missiles namely Pradyumna or Prithvi Air defence missile for high altitude intercept and the 2nd is AAD (Advanced Air Defence) missile for lower altitude interception.

Pradyumna is liquid & solid fuel 2 stage ballistic missile defence system i.e. designed to intercept with a max. altitude of 80 km and so comes under exoatmospheric interceptor missile. The AAD is a single stage solid fuel based ballistic missile defence systems with a max. interception altitude of 30 km. So comes under endoatmospheric. These systems will use interceptor missile in conjunction with Israel's Green Pine Radar to detect, track and intercept air bourne threats.

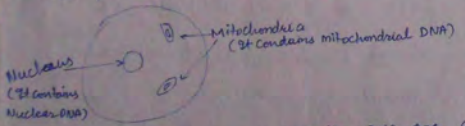
India has already successfully tested the AAD to foil the attack of 2000 km range incoming ballistic missile.

3 Parents IVF technology
or
→ Mitochondrial Inheritance

1951
1978 → Test tube baby

Sperm + Ovum → Fertilization → Zygote

Every body cell requires energy, MC works as the power source for cells.

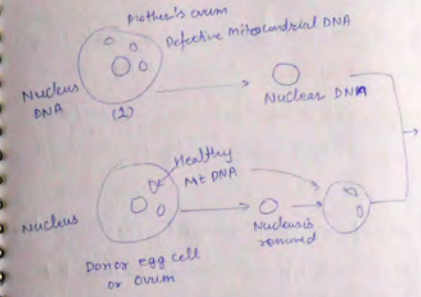


Apart from Nucleus DNA, Mito. DNA are also inherited from mother
Mito DNA → is only material inheritance.

If defective mito DNA then low energy and effects are
- → muscular weakness → brain can also be affect encephalopathy e.g. Dementia
- → liver disease → could also lead to death
- → blindness, deafness → brain stroke also
- → cardiac malfunction → accumulation of lactic acid. Lactic Acidosis

→ diabetes can also be transmitted.

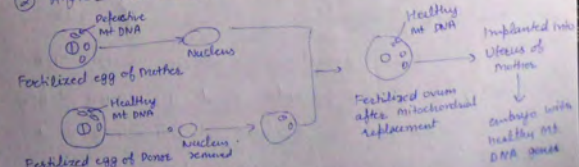
In U.K. → HFEA → Human Fertilisation Embryology Authority



fertilized egg or Zygote
↓
Now this is implanted into uterus of mother where embryonic development takes place.

This method is ① before fertilization method.

② After Fertilization method



Science and ethics

① Confusion of identity or identity crises i.e. who is the actual mother.

② Commodification of children by selecting the superior genes i.e designer baby

③ Eugenics - related to selection of superior genes. So this technique may be used in Eugenics.
→ is a type of extreme racial descrimination

But qustion here not about designs babies but about life and death. So this overweighs the ethical concerns.

④ We are destroying one embayo in this process

Mitochondrial Replacement (IVF using genes of 3 parents)

Britain is set to become the 1st country in the world to allow a controversial IVF technique that produces embryos with DNA from 3 people - 2 parents and a women donor. In an attempt to prevent debilitating and fatal mt. diseases which are passed down only from mother to child

Mt act as tiny energy generating batteries inside cells. The technology involves intervening in the fertilization process to remove faulty mt. DNA which can cause inherited conditions such as

Cardic malfunction
liver failure
Brain disorder with dimentia
Blindness
Muscle weakness
Deafness and
Diabetes

The technique involves taking a donated egg cell of an unaffected women and then remove its nucleus and chromosomes containing the genetic information but retain its healthy mt.

The nucleus from the egg of an affected mother would be inserted into it either before or after fertilization and the fertilized egg would then be implanted in the mother's uterus. A baby born as a result should be free of mt. defects and the child's own eventual offspring should also be free of these changing the genetic line forever. So this means the baby will inherit DNA from 3 biological parents, the mother, father and the donor women

But scientist say that less than 0.1% of the baby's gene come from the donor in the form of Mt DNA. Acc. to HFEA (Human Fertilization Embryology Authority) of UK, the technique is safe and the consultations has found widespread public support for it. But critics suggested it may ↑ the risk of unforseen health problems

Ethical Concerns

British laws on fertilization and embryology do not allow germ line or inheritable gene therapy But in 2008 there were changed to allow Mt techniques. These therapies are not yet ready to be performed in practice but it is thought that scientist in UK are nearing the point where it will become possible.

HFEA is a statutory body in UK that regulates and inspects all UK IVF clinics and embryology research including use of donated reproductive cells and creation of human embryo outside the body. HFE A acknowledges there are concerns about whether this tech has the potential to confuse a child over his or her identity. Because it would result in babies having DNA from 3 parents + some from a third person. So the child born from this technique will not be given the right to know the id of women who donated the egg cell as she will not be officially recognised as parent. Advocates of the procedure say Mt. DNA contains just 37 of the estimated 20000 genes of human genome making concerns about identity a non issue. HFEA acknowledges critics say that new tech is ethically suspect and will result in slippery slope to designer babies market and aborting disabled people. A designer baby is a 'baby genetically engineered in-vitro for specially selected traits leading to commodification of children. The most heat generated in the debate has been about whether the tech heralds a new era of eugenics which is the practice of nurturing desirable human traits through reproduction but has often been associated with political and racial extremism. These may be an effort to improve future people that goes

even beyond ideas emphasising forced sterilisation programmes in Nazi Germany. The british govt. however says it should be allowed to go ahead under strict regulation by HFEA. It is not about designer babies but life vs death. Acc. to HFEA what it is recommending is merely that the scope of the permitted use of reproductive technology be widened

Vaccine Derived Polio Virus (VDPV)

25th Feb 2012 → India was declared a polio free country.

Polio Myelitis

P_1, P_2, P_3 are 3 different strains of Polio virus.

Person gets infected by Polio via faeco-oral route.

It stays at throat & intestine and multiples. But when it the spinal cord route and multiples there then it destroys motor neurons and even damages the brain cells.

→ No treatment but only prevention

→ vaccines
① Live attenuated (weakened virus) vaccine → pathogen → Oral polio vaccine
② killed or inactivated vaccine → IPV (Inactivated Polio vaccine)

* P_1, P_2, P_3 → wild Polio virus → means the naturally occuring strain (not $\frac{3}{2}$ means found in forest)
* Vaccine type virus means that vaccine which is given for protection reverted back in the form of polio myelitis (adverse reaction) → Vaccine associated Paralytic Poliomyelitis. (VAPP)

Neuro virulence form

USA in 2000 ~~the~~ banned oral polio vaccine due to its adverse reactions.

→ lack of sanitation measures
→ vaccine derived cases
} are the hurdles in eradication of Polio from developing countries

In view of the progress in Polio Eradication India achieved a major milestone in 2012 with world health org. striking it off the list of Polio endemic countries on 25th Feb 2012 after India completed one year without any case of polio. Unfortunately a 10 month old baby in Beed district of Maharastra recently got infected by a vaccine derived polio virus the virus in question is not the wild type that is the virus that causes Polio disease but it is vaccine type ine virus that could derive

from vaccine strains. As per WHO definition since only wild type infections are taken into consideration for deciding Polio free status of the country so the latest infection will not alter India's polio status. True polio eradication is zero incidence of polio virus infection by both wild and vaccine viruses. Vaccine Associated Paralytic Polio Myelitis is rare adverse reaction following live attenuated oral polio vaccine. Inactivated Polio virus vaccine does not contain live viruses so it can not causes VAPP the mechanism of VAPP is due to mutation which occurs when the live attenuated virus used in the vaccine which are genetically prone to reversal cause neuro virulence. Although weakened viruses are still alive and quite often undergo genetic changes to cause neuro virulence polio. Hence the very vaccine i.e. supposed to protect children against polio causes the disease.

Vaccine Derived Polio Viruses

(VDPV) are rare strains of polio virus that has genetically mutated from the strain contained in the oral polio vaccine. OPV contains live attenuated vaccine virus, when a child is vaccinated, the weakened vaccine virus replicates or divides in the intestine triggering protective immune response in the child. Like a wild polio virus the child excretes the vaccine virus for a period of 6 weeks. As it is excreted, some of the vaccine virus may no longer be the same as the original vaccine virus as it has genetically altered during replication. This is called (VDPV).

In areas of inadequate sanitation this excreted vaccine virus can spread in the immediate community on rare occasions if a population is seriously under immunised an excreted vaccine virus can continue to circulate for an extended period of time. The longer it is allowed to circulate the more genetic changes it undergo

In rare instance the vaccine virus can genetically change into a form that can paralyse known as circulating VDPV.

13/08/13

SJT

ECONOMICS OF ANIMAL REARING

Agriculture and Allied sectors - Target → 4%
achieved → 3.6%

It contributes 14.1% of GDP

Landless labourers → 11.24%

Marginal (less than 1 hectare) → 62%
Small (1-2 hectare) } → 80%

National Policy for Farmers 2007

Small holdings are more productive than large holdings in India.

But here land - man ratio is adverse :: of large family size. So even ~~subsistence~~ subsistence level is not there. So solution is in the form of CROP + LIVESTOCK ⇒ Integrated Farming System → also known as Mixed Farming

Acc. to Agri. economics 10-15% income be generated through mixed farming

In livestock rearing also there is segmentation of livestock farmers:

Resource poor or underprivileged

① They use small ruminants like goat or traditional breed cow which have low productivity

Whether these have access to veterinary clinical services or livestock Extension services

② Lack of access to Credit

Resource Rich

Access to credit. So can buy cross breed cows which are more productive e.g. KARAN SWISS

* India is lacking in cold chain to preserve and process milk
* AMUL's marketing network GCMMF like org. are in very less quantity.

Opportunity → India is contributing 1% of the world production. So it can be increased.
→ In export sector also there are huge opportunities but we have to meet the stringent International Quality standards.

weakness → lack of infrastructure

Agri. and Allied sector (AAS) contributes 14.1% of GDP employing 58.2% workforce. Avg. Annual Growth of AAS during 11th five year plan was at 3.6% and fell short of 4% growth target. The ownership of land is highly skewed with 62% of the rural household owning < than 1 hectare of farm. So avg. size of land holding is very small and there is also further fragmentation of holdings leading to a much larger incidence of very small operational holdings. Lower the size of holding higher is the use of inputs, Crop intensity, and coverage under high yielding varieties. So Agri. productivity of Marginal & small holdings is found to be higher than large holdings (> 10 hectares). Despite of strong advantage in land productivity and much better production performance, small holder earn extremely low income from agri. on / capita basis due to highly adverse land man ratio. Taking into account size of family / capita income from agri. / hectare. Majority remain under poverty

If do not earn income outside agri

In this context National Commission for Farmers under Dr. MS Swaminathan recommended creating multiple livelihood opportunities through crop + livestock integrated system.

So mixed farming (Crop + livestock) is the most relevant system of farming to Indian conditions because of small size of % holdings and unsound economic status of avg. Indian farmer.

The food basket of Indian consumer is changing fast. Sustained Economic & Income growth and a fast growing urban population are fuelling rapid growth in demand for high value food products like fruits, vegetables, milk, meat, egg, fish. The share of protein food within overall food expenditure ↑ed from 26.2% during 1950-60 to 33.7% during 2007-12.

Livestock including poultry is one of the imp sources of livelihood Contributing about 1/4th or 25% of the agri. GDP. These activities engage women in much larger proportion. The ownership of livestock is much more egalitarian since poor farmer families mostly own cattle, buffalo, sheep and goat. The livestock sector achieve an avg. growth rate of 4.8% during the 11th 5 year plan. ACC to livestock Census of 2007 the cattle population as 529.7 million and poultry birds as 648.8 million

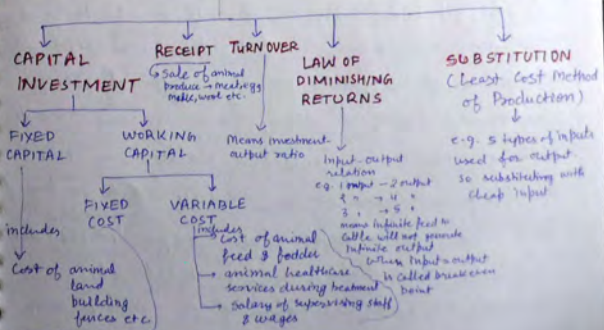
Economic Consideration of Livestock Farming

India is the largest producer of milk

1990-91 → 53.9 % million tonnes

2011 → 127.9 "

Per Capita milk availability → 290 gm/day (world avg is 284.3 gm/day)



India ranks 1st in the world in milk production which has gone up from 53.9 million tonne in 1991 to 127.9 million tonnes in 2011-12. The Capita availability of milk has also ted at the level of 290 gm/day in 2011-12. This is comparable with the world / capita availability of milk at 294.3 gm/day for 2011. This represents sustained growth in the availability of milk and milk products for the growing population of the country apart from being an imp. secondary source of income for rural families.

Economic consideration of livestock farming

Receipt The sources through which income is received include sale of animal products meat, milk, egg and wool. The mode of receipt of income is dependent on the type of stock maintained. From a diary farm income through sale of milk is received daily. so the diary farmer can have ready cash in hand to incur it days to day expenditure on animals as well as to meet its domestic needs while when sheep are reared for wool production, the farmer gets income only at the shearing season which can be 2 times a year under Indian conditions.

turn over is an investment - output ratio which varies from farm to farm depending on species from , production potential of animals, size of the farm, proportion of fixed capital to working capital under mixed farming keeping animals as well as raising crops can proved to be a more efficient profit gives than animal rearing alone. Turn over can also be considered as the speed with which the gross income obtained from the business equals the capital investment on a dairy farm this can be 3-4 years depending on the level of production of cows maintained. cross breed cows yield greater quantities of milk impove turn over considerably. so in a livestock farming turn over is quicker. A poultry farming may start paying as early as 5 months from the day of procuring day old chicks. the farmer should avoid construction of expensive building and fences as they are unproductive and retard the rate of capital turn over.

Law of diminishing Returns This law governs the input - output relationship. In general total output or yield of product ↑es most rapidly with a first few units of input, then continues to ↑ but at a slower rate, until it reaches the point of maximum total output. Then at this point additional input does results in a decline

able to know the breakeven point when the no. of inputs and outputs are equal.

Substitution It is the principle on which least cost method of production is based. If the output of a product remains constt. and the product is of a equal quality. It is good business to substitute 1 factor for another when the cost of the substitute is less than the cost of resource it replaced e.g. If the total milk production and its quality are not affected, a part of ration of dairy cattle may be substituted by feeding urea - molasses mixture which provides nutrients at a much cheaper rate.

India's contribution in livestock product export < 1%

- 80-82% → meat products
- 1% → dairy "

FAO + WHO

CODEX, ALIMENTARIUS COMMISSION

Food Additives

Poultry Farming

Poultry Development Programmes

- Assistance from state poultry farms (Mother units)
- Poultry estates
- Rural Backyard Poultry development

Day old chicks are converted into

- layer (which lays egg)
- Broiler (for meat)

NECC (National Egg Coordination Committee) supplies input players and creates awareness about the nutritional quality of the egg.

Contract farming

General issues

Since economic growth is a dynamic process the small holder subsistence system would have to be enabled to carefully graduate on to a resource rich commercial system. Since it may not be feasible for the former to continue and inviable existence for long. A recent world bank study has examined the drivers of pro poor growth and has recommended to give priority to diversification both to high value agriculture and a dynamic non farm sector increasingly linked to agro and urban industrialisation.

It is ambiguous where the smaller holdings can benefit from demand driven growth in high value agriculture. Their inability to access market is one of the major limitations to diversified towards high value agriculture. Rural local markets for high value food commodities are thin and trading in distinct urban market is uneconomical due to high marketing and transaction cost. There is a general shortage of appropriate and conviniently located marketing network. There is little meaning in enhancing milk productivity without providing marketing facilities. A good year of milk production would bring direct to the dairy farmers of Gujarat which has an effective marketing network under AMUL for milk collection but in states like Orissa, Bihar, Kerala & Karnataka because excess supply would lead to prices falling. There are also constraints like lack of access to credit, tech, inputs and services including shortage of feed and fodder, low productivity and diseases prevalency in livestock. Moreover access to foreign market is restricted by stringent food safety and quality standards there.

Export of livestock Products

Meat exporters have to adopt Hazard Analysis Critical Control Point (HACCP) standards. This involves the adoption of quality standards from the state of production to the state of export including processing. Modern

Abattoir or slaughter house also have to adopt good manufacturing practices and monitoring of toxic residues, pesticides, heavy metals in meat.

India still accounts for miniscule part in the world trade i.e <1% in livestock products and there is great scope for prosperity both for the farmers as well as for the processors and exporters. Due attention is given to efficient monitoring and stringent quality control. WTO has led to opportunities as well as threats in the livestock sectors. There is need to streamline the supply chain and pay due attention to HAPCC standards as well as CODEX Alimentarious standards (FAO & WHO)

Poultry Farming

has become one of the fastest growing sub-segments in the agri. sector. Poultry industry provides employment to over 3 million persons and is the only segment of the agri. economy which is growing at about 17% per annum. Poultry litter is an excellent manure containing Nitrogen and phosphorus making the biological fertilizer. It is labour intensive needs comparatively little capital and provides quick return. It has great potential for Non farm employment and for retardation of rural migration. A group of pvt. stakeholders as self regulators in the industry and perform substantial marketing function through NECC (National Small farms which were set up under were not so successful due to lack of technical and marketing support this obstacle can be removed if we encourage the concept of poultry estates comprising of a mother unit and a no. of producers attached to it. The mother unit rear the birds of the point of lays, takes care of the all the critical aspects including brooding, vaccination, feeding and watering. It also takes care of marketing & repayments of loans out of the same

proceeds. Producers will be required to handle only the simple operation of feeding & watering the birds and collection of eggs. Such poultry estates can be successfully operated by rural women under SHGs and can play an imp. role in economic ~~esteem~~ empowerment of women.

Contract Farming (Sriram, Paper-III, P-75)

Contract between the firm and farmer i.e. Farm - Firm linkage

→ APMC Act → a particular produce can not be directly purchased from the farmer. It needs to be purchased through Mandi.

Pepsi Co → tomato + potato → chips making

McCain (Canada) → Potatos in Gujrat

Nestle India Limited

In Case of Poultry → Venkateshwara Hatcheries in A.P.
→ SUGANA in Tamilnadu

Dairy Farming

Cooperative Farming only 30-35%

The success of dairy farming is on Anand Pattern

NDDB → National Dairy Development Board

Operation Flood was channelised under NDDB.

Phase I (1970-1980) - was financed by European Economic community they gifted skimmed milk powder + Butter oil
→ 18 milksheds were created and started to for consumers of 4 metro cities.

Phase II (1981-85) → ↑ed no. of milksheds from 18 to 136
village milk producers were also ↑ed

?

Phase III (1986-1996) → Consolidation phase
→ ↑ in more no. of milksheds
→ ↑ marketing infrastructure