IDSA POLICY BRIEF

Back to the Basics: Foot and Hoof Mobilty in the Mountains

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Summary

India needs to be prepared for mountain warfare. Some excellent commentaries emphasize capacity building for better fire power including appropriate precision guided munitions, communications, heliborne operations, and intelligence. While these capacities must be built up, at the same time non-material factors are also equally important, foot mobility being one among them. This Brief argues that foot mobility is central to mountain warfare. It first uses historical evidence to show the advantageous use of this capacity by the victor. It then argues for preserving this 'military biodiversity' by including indigenous breeds of animals. It further co-relates the factor of ethos of physical fitness and endurance of the troops. In essence all troops must share the attributes of mountaineers. In conclusion, consolidated policy suggestions are offered.

Smokin' my pipe on the mountings, sniffin' the morning cool,
I walks in my old brown gaiter along o' my old brown mule
Rudyard Kipling (Screw- Guns)

Introduction

While the Himalayan terrain is likely to remain unchanged, it may be affected by climate change. The Indian military is destined to be deployed in the Himalayan region for a long time. The bulk of the military is deployed in the mountains of Jammu and Kashmir (J & K), Himachal Pradesh, Sikkim and Arunachal Pradesh. Although better roads may have improved vehicle mobility, most often and in most places troops will have to march on foot with loads on man pack or on animals.

Even in peace time, two events show how road links in the fragile Himalayan terrain can get severed. The August 2010 cloud burst in Ladakh and the Sikkim earthquake in September 2011 followed by heavy rains severed all road communications. As a counterfactual, if military operations had been ongoing, foot and pack mobility would have helped in speeding up disaster relief.

India needs to be prepared for mountain warfare. Some excellent commentaries emphasize capacity building for better fire power including appropriate precision guided munitions, communications, heliborne operations, and intelligence.[1] While these capacities must be built up, at the same time non-material factors are also equally important, foot mobility being one among them.

This Brief argues that foot mobility is central to mountain warfare. It first uses historical evidence to show the advantageous use of this capacity by the victor. It then argues for preserving this 'military biodiversity' by including indigenous breeds of animals. It further co-relates the factor of ethos of physical fitness and endurance of the troops. In essence all troops must share the attributes of mountaineers. In conclusion, consolidated policy suggestions are offered.

Need for Foot Mobility

Foreseeing the need for foot mobility one study has argued that

> "due to glacier melt and warming, rapid melting of ice is forecast. This would lead to flash floods and severing of road communications. Rapid and unexpected situations would require

[1] Gurmeet Kanwal, "Wars in the mountains: Capacity building needed for future conflict", CLAWS *Article No.* ***1927,*** August 14, 2011, at http://www.claws.in/index.php?action=master&task=928&u_id=7.

> reliance on redundancy or alternative means of communications. Interestingly, reverting back to an era of greater reliance on animal transport and the necessity to sustain the legendary capacity of the Indian Army to march is the need of the environmental hour. Mustering animal transport and having a capacity to march cannot be improvised. This capability has to be sustained."[2]

However, due to the general perception that better roads may come up and helicopters would be available for mobility, two things have happened. First, given this false sense of mechanized mobility (surface and air), the marching regime has been neglected at the institutional level, thus reducing the capacity of troops to march in the mountains. Second, the availability of animal transport has reduced across the board. Both these developments have an adverse impact on military capability. Why do we say this? Why does the Indian military require more animal transport? Why does it become important in today's world of mechanization?

To understand the reason, one has to dwell on the security environment confronting India. Other than part of the Line of Control (LoC) in the Jammu region and part of the Line of Actual Control (LAC) in Eastern Arunachal Pradesh, hostilities with our two principal adversaries are most likely to occur in high altitude regions. Of these, only a small portion in Ladakh experiences clear weather, although it too experiences extreme weather conditions. The remainder of the high altitude regions experiences hostile weather, high levels of snow in winters, high levels of rainfall, low visibility and thick vegetation up to an altitude of 12000 to 13000 feet above sea level. These conditions restrict the employment of helicopters and aircraft, disrupt surveillance, disrupt surface communications and aids infiltration or covert operations. The employment of helicopters in the mountainous region is affected by weather conditions and also due to non-availability of landing sites. Further, due to their lower speeds and limited approach through valleys, it is difficult to use helicopters across borders without being intercepted by the enemy. Major military operations in such a terrain will depend upon turning around the defences of the enemy with the help of infiltrating forces and Special Forces action followed by a quick linkup. Technology and fire power will hardly allow conventional operations through well known and surveyed axes by either side.

The Sino-Indian War of 1962 amply clarifies the issue; basic war fighting principles have hardly changed in this region even with advances in technology. The folds of the mountains along with low visibility and thick vegetation will favour the side that uses high foot mobility. In mountainous terrain war is an aggregate of battles to dominate the heights. Irrespective of the quantum of troops employed, mountain warfare is all about

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[2] P.K. Gautam, "Changing Geographical Factors in Planning and Conduct of India's Military Operations", *Strategic Analysis*, Vol.32, No.2, March 2008, pp. 245-58.

capturing and consolidating the dominating heights. The defences in the mountains can be turned around in many ways: by capturing features in the rear of the defensive position, capturing the second tier of defences, dominating the axis of maintenance, etc. The same will be required if one wants to take the battle into enemy territory. This would call for high foot mobility and a high degree of sustainability. Even if enough road infrastructure is developed operations cannot be planned along these axes, although maintenance will perforce have to be based on them. With the availability of precision weapon systems, it would be naïve to consider that the enemy will not disrupt these axes. Thus any operation in these areas will involve moving on a less developed sector with most of the troops moving cross country. This will especially be true once the LAC or the LoC is crossed. These forces would need to be self contained for a number of days. The load carrying capacity of men gets restricted at high altitudes. Two major issues become apparent in this scenario: one, soldiers need to be physically tough as per terrain requirement; and two, there will be a requirement for well trained and battle inoculated animal transport in large numbers. These will become even more critical for operations across the LAC/LoC. Other important issues that require consideration are modifications to weapon systems to make them suitable to be carried on animal transport and quantification of loads as per the latest inventory of equipment held by fighting soldiers and especially catering for their high ammunition requirements. Other than World War II and the 1962 conflict, there have hardly been large scale military operations in high altitudes in recent history. The Kargil war, though not fought on a large scale, has also highlighted the issues discussed. It will be inappropriate to draw lessons from other unrelated wars. There is thus a need to reassess the requirement of animal transport in the Indian Army and ensure high physical standards of the troops.

Examples from History

Let us recall two events in the history of independent India. During the J & K operations in 1947-48, most of the fighting and marching was on foot and hoof. This included the columns which marched up from the plains of Punjab (now Himachal Pradesh) to Leh and other columns which negotiated the Ladakh range to reach the Nubra valley. Foot columns could not link up with Skardu in spite of repeated attempts.[3]

The greatest feats were demonstrated on what is now called the Upshi- Manali axis by column "Arjun". The role of foot columns called "Arjun" was so vital that even before an air head could be established at Ladakh on 24 May 1948 logistic columns had been launched for logistic support of the infantry columns which had marched ahead. The

[3] *Operations in Jammu and Kashmir*, 1947-1948, Ministry of Defence, Government of India, 1987, pp. 325-47.

leading "Arjun" column of 2/8 Gorkha Rifles took 25 days to reach Leh.[4] At that time Zojila pass was still in enemy hands and there was no other land route except the one via Manali to reach Leh and defend it from the enemy. The route was 400 km long over a number of passes in high altitude. A column called "Chapati" consisting of 1200 mules with loads left Manali on 12-13 September 1948. From Leh a link up column "Chawal" then met at a transfer point at Lun. Both columns returned to their bases at Manali and Leh.[5] The official history records that the Ladakh operations showed once again the crucial importance of logistics. It was essentially a war of supplies and reinforcements.[6] It is no surprise that this marching capacity has been acknowledged as legendary. It would not have been possible to accomplish such feats overnight. It was a result of the high standard of training. The battle of Zojila is in public memory because of the innovative use of tanks. What is less known is the fact that each infantry battalion of the famed 77 Parachute Brigade had an animal transport company in support from the 4 Animal Transport Regiment.[7]

The popular history of the 1962 war embedded in the public psyche is that the Chinese troop strength was overwhelming: "waves and waves of hordes". This impression needs to be corrected. It is now known that in the Walong sector the Chinese had just one division, in the other sectors of the North East Frontier Agency (NEFA) or Kameng they had three divisions plus, and a division in Ladakh.[8] The Chinese capacity to operate on animal and man pack with such swiftness must not only be admired but needs to be emulated. There is no substitute for this mode of mobility in the Himalayas. The enemy is the best teacher. During the war, the Chinese managed to attack positions in depth such as Sela and Bomdila by infiltration using man pack and infantry mortars moved by draught animals. The movement of such deep penetration is one understudied aspect. However, what is clear is that such a capability is still a virtue.

The last example is the problem of moving mountain guns during Operation Vijay at Kargil in 1999. Because mountain guns have been replaced by towed field guns and the

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4 Colonel (Retd.) R.D. Palsokar, *Red Pompons: History of the 8th Gorkha Rifles 1947-1992*, Shillong, 58 Gorkha Training Centre, 1993, p. 68.

5 Note 3, p.337.

6 ibid.

7 *History of the Army Service Corps 1947-1976*, Vol. 5, New Delhi, Directorate General of Supply and Transport/ Sterling Publishers, 1977, pp. 41-42. From December 1947 till June 1948 the only Royal Indian Army Service Corps Animal Transport (AT) unit was 8 AT Regiment in J & K valley. For recapture of Zojila and Dras 4 AT Regiment was deployed. See Maj. Gen. P.K.D. Kapur, *Foot Prints and Milestones: A Story of Army Service Corps,* New Delhi, Directorate General of Supply and Transport, December 1990, p. 99.

8 Maj. Gen. Ashok Kalyan Verma, *Rivers of Silence*, New Delhi, Lancer Publication, 1998, p. 28.

small calibre was considered as required no longer, only mortars were known to have been left to be moved by draught animals such as Mule Artillery (with the Army Service Corps and not Regiment of Artillery) in some sectors. Mountain Artillery with mules had become history. With the conversion of Mortar Regiments from pack to towed, Mules Artillery were shed and reduced in numbers only to be operated by the Army Service Corps (ASC) for moving mortars as the need arose. Mules General Staff similarly were also reduced from the logistic chain as infrastructure like motor roads grew. However, in some sectors, a few legacy mountain guns remained. Thus, in the Kargil sector, when the need arose, it took nearly half a day for over 100 men to manhandle a 74/24 mm gun for direct shooting.[9] Although Indian gunners can perform impossible feats, this is nothing to celebrate. Even two 120 mm mortars in Sub Sector West (renamed Sub sector Hanif) had to be moved by man pack for 5 to 8 kms. It was perhaps the first time in the sector that 120 mm mortars were moved on man pack basis.[10] This feat is no compliment for strategic thinking, but an example of improper military preparations. Mortar and mountain guns need to be moved quickly and if road or air connectivity is not available, then animal transport is the time tested craft for mountain warfare. Military effectiveness is about not wasting manpower especially in times in war. The services of Mule Artillery were sorely missed.

The role of animal transport for supply of ammunition to mortars in the operations has been acknowledged. But no policy to exploit this capacity and learn lessons from its absence has been considered. This is all the more pertinent as Kargil was just a limited point on the map of India, whereas the Himalayan terrain extends east to west over thousands of kilometres. This does not mean that pack units must be re-raised with mountain guns. But what it highlights is that more capacity of this kind must now be inbuilt for troops who operate in the mountains. Mortars, both infantry and artillery, are the ideal weapons in the mountains for self contained columns. This aspect may need a re-look more so when additional mountain divisions have been raised for offensive roles. It is in this spirit that the history of the ASC notes that in actual operations, the demand for animal transport will certainly go up.[11]

Even Special Forces of the US and NATO in Afghanistan's rugged mountain terrain have been known to operate and ride local ponies for mobility. Therefore, riding and animal management skills are a prerequisite for even Special Forces. The importance of

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9 For a rare photograph, see Col. Gurmeet Kanwal, *Kargil '99, Blood, Guts and Firepower*, New Delhi, Regiment of Artillery /Lancer Publishers, 2000, p. 33.

10 Colonel Anjan Mukherjee, *History of the Regiment of Artillery, 1966-1999*, Directorate General of Artillery/ Lancer Publications, 2002, pp. 300-01. For a rare photograph of troops moving the mortar man pack see Colonel Gurmeet Kanwal, *Heroes of Kargil*, New Delhi, Army Headquarters, 2002, p. 132.

11 Brig. S.K. Dahiya (ed.), *History of the Army Service Corps 1977-1998*, Vol. 6, New Delhi, Directorate General of Supply and Transport/Variety Books, 1997, p. 133.

animal transport can be gauged from the fact that during World War II, British ships were modified especially to carry a total of 4179 mules from the US to India for use by British and Indian troops operating in Burma and later on for American and Chinese troops operating in that country.

Loss of Biodiversity

Breeds of local ponies and yaks are also declining as part of the national trend of loss of biodiversity. Yaks were used in some sectors to move artillery guns, evacuate casualties and for administrative loads during the wars with Pakistan and China. For long range patrols yaks were of immense value. In freezing cold a soldier could sleep next to the animal for warmth. If two animals were available then their backs made a perfect U-shaped bed.

With the conversion of Ladakh Scouts into Ladakh Regiment, local ponies which were earlier part of the Scouts are now being transferred to ASC units. This has led to local Ladakhis not being mandated to operate local ponies; instead, the ASC handles them. Though the ASC is professional enough to take on this job, no amount of training can give the instinctive knowledge which the jawans of Ladakh Scouts have in handling these animals. There is also a need to boost the breeding of local ponies in large numbers sufficient for military operations. Currently the provisioning of load carrying animals is done through breeding centres managed by the Remount and Veterinary Corps (RVC) of the Army. The Army has two types of mules as load carrying animals, i.e. Mule (General Service) and Mule (Mountain Artillery).Thus local ponies do not form part of the inventory.

This, however, is not to mean that local ponies (load bearing animals of horse family) have no place in today's socio-economic environment. Even today large numbers of ponies are hired by the Army all along the Himalayan belt for maintenance of forward posts. These local ponies obviously are more suitable for the local conditions given that they are likely to have genetically evolved to adapt to the environment. This aspect needs to be harnessed not only to maintain biodiversity but also to meet operational military requirements. A right mix of initiative and pragmatic planning by the Army and Department of Animal Husbandry, Dairying and Fisheries under the Ministry of Agriculture can achieve the desired results.

Traditionally yaks, horses, ponies and mules have been used in mountainous region as load carrying animals. In the plains, donkeys are also used. In general, an animal can carry 80-150 kg of load for about 20 kilometres. Due to the development of road networks and the high cost of ownership coupled with diminishing grazing areas, the demand for these versatile animals has been dwindling. As per the figures from the Department of Animal Husbandry given in the Table (see below), the livestock population of these animals has decreased in the last two decades. In one way this is a loss of national

biodiversity. And from the military point of view, this decrease will affect the meeting of future operational requirements. Therefore, the revival of local breeds will be profitable both from the perspective of biodiversity as well as military needs.

Table: Livestock Population-All-India Census Estimates (1961-2007)

(In millions)

Species	1961	1966	1972	1977	1982	1987	1992	1997	2003	2007
Horse & Ponies	1.30	1.10	0.90	0.90	0.90	0.80	0.82	0.83	0.75	0.61
Mules	0.05	0.08	0.08	0.09	0.13	0.17	0.19	0.22	0.18	0.14
Donkeys	1.10	1.10	1.00	1.00	1.02	0.96	0.97	0.88	0.65	0.44
Yaks/Mithun	0.02	0.03	0.04	0.13	0.13	0.04	0.06	0.06	0.06	0.08

Source: Basic Animal Husbandry Statistics, 2010, Department of Animal Husbandry, Dairying and Fisheries, Ministry of Agriculture, Government of India.

Breeding Farms and More Animal Transport

As per a survey by the Government of India at table above there are approximately 1.3 million equines out of which approximately 1.27 million are donkeys, mules, horses and ponies. The word 'Equine' is derived from the Latin Equinus, which means any horse or horse like animal especially of the genus Equus family Equidea (horses, asses& zebra). The mule used by the Army is a hybrid offspring of a male donkey and a female horse which is generally sterile. The characteristics of mules and Yaks are at Appendix to the paper. Mules and horses for the Army are supplied from breeding farms located at Babugarh (Uttar Pradesh) and Hempur (Haryana). The average life span of a mule in the Army is approximately 16-20 years; it is usually trained by the age of four. The Army has chosen the mule because it combines the desired qualities of the horse and the donkey, resulting in a sturdy animal. Ponies are used by the local population and there are many breeds like the Zanskar ponies of Ladakh, Manipuri ponies, Spiti ponies, Bhutia ponies etc., besides yaks which are used in higher mountain reaches for carrying loads. The local breeds are strong and hardy and have very good adaptability to extreme geo-climatic conditions. As per the latest data, the strength of Manipuri ponies, considered to be the purest and most prestigious breed, is just about 2000. Thus, immediate and urgent efforts are required to conserve these precious breeds of ponies in India; else there is going to be a big loss to biodiversity of the region.

At the national level, a National Research Centre on Equines (NRCE) was established under the Indian Council of Agriculture Research (ICAR), for research on equine health and production. NRCE is located at Hisar and was established on 07 January 1986. In addition, the National Research Centre on Yak at Dirang, Arunachal Pradesh under the ICAR with a yak farm at Nyukamadung at an altitude of 2750 metres is functioning as a premier institute. Some state governments have given impetus for the breeding of ponies

and conservation of specific breeds. The Jammu and Kashmir Government has established a Zanskar horse breeding farm at Padum in Kargil district of Ladakh for breeding, conservation and improvement through selective breeding. Besides this there are a large numbers of animal farms which cater for cattle or horse breeding for commercial or sports needs. Thus it is not difficult to meet the enhanced requirement of load carrying animals within the country. In order to optimize load carrying capacity, especially at higher altitudes, it will be prudent to use region specific breeds rather to have a set standard for ease of inventory. The requirement can be met by engaging with the state governments and through the ICAR to breed animals for military requirement. This will also improve the socio-economic conditions of these states besides preserving their biodiversity. Another way could be to set up breeding centres in these forward states through 'Op-Sadbhavna' undertaken by the Army and transferring them to the local administration. In doing so, the aspect of training of these animals for military use will have to be taken into account. The same could also be outsourced to the state government or private agencies to generate employment opportunities in these regions. The important military issue with respect to animal transport which has not gained adequate attention is research and development in packing of loads, improvement in saddlery and modification of weapon systems to make them suitable for being transported by animal transport.

Physical Fitness of Troops

Increasing urbanization has laid to rest the romanticism of the rural area-specific slogan of "Jai Jawan Jai Kissan". The quintessential soldier material is no longer the village rustic having a keen eye for all tasks related to Mother Nature. Recruits from agricultural or rural settings are on the decline. More numbers from industrial towns/cities are being enrolled. Due to urbanisation, the traditional knowledge and physical attributes linked with a rural upbringing that are essential for soldiering are declining. There is an interesting contrast between the past and the present. During the post World War II and post partition periods, a majority of troops were tough, rustic and uneducated. Mastering the technology of modern weapons was then a challenge. Now an element of "softness" has crept in which cannot be eradicated by urban workouts or gyms. Moreover, the problem has become reversed. Troops are quick to grasp technology intensive equipment but fall short in essential attributes of physical and mental toughness. The challenge is how to keep the troops tough and frugal with a capacity to take and absorb privation and the rigours of soldiering. For officer material, which traditionally has been from urban areas, softness is about to assume alarming proportions.

The peak physical fitness of soldiers is critical for operations in the high altitude regions because of rarefied atmospheric conditions and the arduous terrain. Some of the physical challenges include weight of the personal equipment, weapon and ammunition, size of the lungs, natural fatigue caused by the cold and duration of stay. Generally the peak

strength of an individual in the mountains is approximately 80 per cent of that at sea level although this can be achieved only after a stay of 90 days. Taken together all these challenges are devastating for soldiers who are in poor physical condition and who then become a burden on their units.[12] Efficiency actually keeps reducing as the altitude increases. Lifestyle-related illnesses are on the increase in India and would certainly affect the physical fitness of our troops. In one of the surveys published by a leading newspaper, it was opined that close to 30 per cent of Army troops are not fully fit.[13] It will become increasingly difficult for the military to ignore such issues. There is already a growing concern about this issue in the military. The issue of declining physical standards is closely linked with weakness in policy implementation and lack of resolute intent by commanders at various levels. It is not difficult to find over-weight and seemingly unfit troops, especially officers, in the military. There cannot be any substitute for the physical fitness of a military man, especially given that a major portion of our borders is in high mountain ranges. Thus, there is a requirement to address the issue both at the policy level and also at the implementation level. There is no use of laying down tough standards if they are not enforced. The fitness of the troops is an organizational requirement and cannot be left as an individual's priority. The tendency to lay excessive importance to tactics and manoeuvre over fitness during limited exercises conducted by the military may need to undergo a change. The role of officers in the Indian military is too important and thus the officer class needs to be more physically fit to lead the troops. There is thus an urgent need to go back to the basics of endurance and sustenance training.

Policy Suggestions for Animal Transport

First and foremost is the importance of working out the load requirements of the formations operating in high altitude regions for sustained offensive and defensive operations based on a realistic requirement of animal transport. There is a need to factor in new weapon systems inducted into fighting units and the heavy expenditure of ammunition expected during hostilities. While a large number of troops have been moved up in forward posture, there has not been a proportional increase in the animal transport component over time.

Second, additional units when raised should be provided local animals and the requirement of the animals should be met from locally established breeding centres of the state government or institutes of the central government like the IARI. This will not

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12 W. Russell, "Leadership insight for Military Operations in Cold Weather and at High Altitude", Institute of Medicine, National Academy Press, Washington, D.C., 1996.

13 Durgesh Nandan Jha, "Unfit Army? Survey Finds 30% Overweight," *TNN*, September 5, 2011, at http://in.mg50.mail.yahoo.com/neo/launch?.rand=9l284v5te6b7j.

only provide sturdier animals but also improve the socio-economic condition of these regions. Too much effort is not required in this direction since breeding centres already exist in some states. The induction of yaks, Zanskar and Manipuri ponies needs to be trial-evaluated.

Third, the military must lay more emphasis on troop exercises involving the movement of units and formations based on animal transport and sustenance of the troops to assess the actual requirement with respect to animal transport. This will train troops in sustenance, packing of loads and management of animal transport in hostile weather and operational conditions. Thus the emphasis has to shift towards exercises with troops instead of war gaming on sand models.

Fourth, there is a need to improve the research and development efforts in equipment, saddlery, modification of weapon systems and packaging requirements to make loads suitable for transportation by animals. The saddlery equipment for using yaks needs to be developed as none exists.

Policy Suggestions for Improving Physical Fitness

There is a need to restructure the policy on training during initial induction, unit physical training, sports training, adventure activities and sustenance training more scientifically in order to generate knowledge and interest in physical fitness by individuals rather than manifesting it as punishment.

The physical fitness of the troops is an organizational requirement and not a personal requirement. Therefore, a quantifiable policy on endurance, survival, weapon training and night training needs to be linked with performance of the commanders of troops and given higher weightage than is currently assigned in the Annual Confidential Reports. At the officer level, an independent assessment of the officer should be carried out during various courses with specific mention in quantifiable terms of physical capabilities of the officer in his course report. The same should have some contribution to the overall performance of the officer on the course. Station-based assessments of the physical standards of the officers must be formalized instead of unit-wise assessments, and the station assessment must be used in confidential reports. The conduct of exercises purely to assess the physical fitness standards of the troops may be instituted while laying down priority for field and battle craft coupled with sustainability.

Conclusion

Mobility in mountains and high altitudes demands a very high degree of physical fitness. This is the reason why local populations in these regions are so tough and adaptable. Though the Indian Army is raising local 'home and hearth' battalions, the numbers of such troops are limited. Therefore, troops hailing from other parts of the country need to be made as fit as the locals. The general fitness level of the soldier has already been

adversely affected by current lifestyles. The growing reliance on technology at the cost of physical fitness has probably crept into the policy making process as well. This trend needs to be arrested because a tired soldier is easily demoralized when faced with difficult conditions, which is a common experience in high altitude terrain. Well trained and equipped soldiers will be required and they need to be provided with the necessary mobility to take the battle into enemy territory. Here, Animal Transport will be an indispensable element that will be required in considerable numbers. India has enough resources in the form of breeding centres, technical know-how and trained human resources to meet the increased requirement. The need is to first assess the actual requirement and then coordinate with the state and central government agencies. An endeavour must be made to harness local animals which will necessarily perform better. The famous saying that 'victory is still measured by foot' is very true in high altitudes.

Appendix

ANIMAL TRANSPORT PLANNING DATA FOR MULES

1. **Family**: Equidae
2. **Genus**: Equus
3. **Weight**: 363-454 Kg
4. **Lifespan:** 30-50 years
5. **Breeding:** Not being locally available, Mule GS has to be specially bred.[14]
6. **Carrying capacity:** Mule General Staff (GS) 72.5 Kg, Mule Mountain Artillery (MA) 154 Kg

   (a) **Mule GS (some examples):** 2800 rounds BDR or 21600 rounds CTN or , 3000 rounds ball 9 mm, or 14, 81-mm mortar bombs, or 96 grenades or 700 LMG rounds with LMG or one 81 mm mortar, or 80 litres water .

   (b) **Mule MA (some examples)**. Weapon in broken up into loads

   (i) One 75/24 mm mountain gun/howitzer – 8 mules MA

   (ii) One 120 mm mortar - 3 mules MA

   (iii) Ammunition – 3 rounds of 75/24 mm mountain gun/howitzer or eight 120-mm Mortar bombs per mule MA

7. **Marching Speed**: 6 kilometres per hour
8. **Mileage**:

   (a) One day turn around – level road 26 km, hilly terrain 15 km

   (b) For one day's effort – level road 25-32 km, hilly terrain 15-20 km

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[14] Note 11.

9. **Other Relevant Information:** Mule is the sterile offspring of a mare with jack stallion. That is, it is born after the mating of a horse and a donkey. Hinnies are offsprings of female donkeys and male horses. Mules were bred 3000 years ago. Their population is on the decline.[15]

YAK

10. Yaks have three times more red blood cells then ordinary cattle, are half the size, and have huge lungs, perfect adaptation for high altitude. Their heavy coat allows them to survive temperatures as low as 40 degree C below zero.[16]

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15 Rahul Behl *et al*, " The Mule: An Artificially Bred Beast of Burden", *Livestock International: A Quarterly Magazine of Global Perspective on Livestock and Production*, Vol.14, Issue 2, April–June 2010, pp.1,14, 23.

16 Tim Johnson, *Tragedy of Crimson*, New York, Nation Books, 2011, pp. 86-87.