DEMOGRAPHIC STUDY OF PIG MANAGEMENT IN THE SOUTHERN HIGHLANDS PROVINCE OF PAPUA NEW GUINEA

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ABSTRACT

Pig keeping features prominently in farming systems throughout the Papua New Guinea Highlands, but we know less about it than crop cultivation (the subject of many trials and reports). This paper reports on livestock husbandry, herd structure and demography in the central Southern Highlands Province around Nipa. It reports on a series of surveys conducted over twenty-four years on the pig herd of a Wola speaking community in the Was valley. It describes the pig herding regime, reproduction and growth of animals, pig herd demography and the movement of animals into and out of herds. The livestock regime is predictably different to that seen in commercially managed herds. The demographic data reveal some interesting patterns in herd structure. The paper seeks to account for these by placing them in cultural and environmental context. Pigs not only supply meat they are a measure of social standing too. They feature prominently in the socio-political exchanges that characterise Highlands' life. The high point is the large pig kill staged every few years, which impacts significantly on herd demography. Natural events that cause periodic staple crop shortages may also impact heavily on pig populations, and herds may not contribute significantly to food security at such times. The management regime responds equally to social and political issues, as demographic and environmental ones.

Keywords: *Wola, pigs, herd structure, demography, pig kill.*

INTRODUCTION

The aim of this paper is to report and analyse some data on the demography and management of a pig herd in the Southern Highlands Province collected over a twenty-four year period, situating these data in cultural and environmental context. It is a contribution to a small but important body of literature. If there is one topic of conversation heard throughout New Guinea with all its fabled cultural variety it is pigs. Nearly everyone has something to say about pigs. Yet there is scant literature on the composition of pig herds, with some notable exceptions (see Pospisil 1963:203-218; Rappaport 1968; Malynicz 1976; Hide 1981; Boyd 1984, 1985; Kelly 1988; Dwyer 1993). We have taken pig herds for granted, making assumptions about their structure, ecological relations and their control.

These comments are not new, others have made similar observations since the early 1960s (e.g. Vayda *et al.* 1961, note 15; Hughes 1970:272; Vayda 1972:907; Boyd 1984:27,48; and Lemonnier 1990:143). Highlanders are well known for their sizeable pig herds and colourful festivals at which they periodically slaughter large numbers of animals and distribute pork. The Wola of the Southern Highlands, the subject of this paper, are no exception and, similar to people throughout Papua New Guinea, regularly transact pigs with one another. After researchers elsewhere, I have investigated these activities while paying little attention to the logistics of pig keeping (Sillitoe 1979). When we consider the cultural significance of pigs and the prominent part they play in peoples' lives, the overlooking of herd structure seems a stark omission.

Environmental Background

The Wola, with an estimated population of 60,000, occupy five valleys in the Southern Highlands Province, from the Mendi river in the east to the Augu in the west. The data discussed here come from the Nipa Basin Census Division, notably the Was valley. The country is rugged, comprising sharp-crested mountain ridges, ranging between 1800 and 2200 m a.s.l. Watersheds and some valley areas are heavily forested, other settled parts are under regrowth, notably cane grassland. The Wola are swidden and fallow horticulturalists, their neat gardens dotted about valleys. Sweet potato is the staple, typically cultivated in composted mounds, other crops include bananas, taro, various cucurbits and greens (Bourke *et al.* 1995; Sillitoe 1996). A marked gender division informs activities, men undertaking the initial work of clearing and fencing and woman assuming responsibility largely for routine cultivation. Both humans and pigs depend on garden produce, pigs being fed largely on sweet potato.

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Ethnographic Background

The Wola live in homesteads comprising nuclear or extended families, scattered along the sides of valleys, indistinctly grouped together on territories, to which kinship structures access to land (Sillitoe 1999), resulting in loosely constituted kin corporations. The Wola region is divided up into a large number of territories to which these kin groups, called *sem* 'families', claim rights collectively. In the past, supernatural beliefs centred on ancestor spirits causing sickness and death by 'eating' vital organs, powers of sorcery and 'poison', and malevolent forest spirits. Sometimes people offered pigs to restrain these malicious supernatural powers. Today many people profess to be Christians and attend mission services. The region is peripheral in development terms, although the Highlands Highway runs through Wola territory. Cash crops are few, but with gas and oil finds, the position will change, with the exploitation of these minerals.

The exchange of pigs, with other wealth - including cash today and previously sea-shells and cosmetic oil - between defined categories of kin on specified occasions, is a prominent feature of social life. As Lederman (1986:16-17) elegantly puts it for those in the Mendi valley "pigs are not simply good to eat; they are also a form of wealth and have value in so far as they are made to stand for social relationships. Large pig herds are an artifact of socio-political relations that create high demand for pigs". The transactions remain today a significant force for order in this fiercely egalitarian society with weak central government authority, lawless 'rascal' activity being prevalent throughout the region. Men who excel at exchange achieve local positions of renown and influence, approximating to 'big men' elsewhere. But bigmanship does not extend to authority to direct the actions of others.

Similar to people elsewhere throughout the Highlands; the Wola arrange large pig kills called *showmay tok liy* (literally: pig pole kill) at intervals of every few years; depending on the event, these may involve ten or fewer men, or upwards of one hundred slaughtering pigs on the same day. These large communal events are a highlight of their transaction dominated lives at which many people collect for a massive exchange of pork (see Sillitoe 1979:256-276 for details; also Ryan 1961 and Lederman 1986:174-212). Men kill pigs with heavy wooden clubs fashioned for the purpose (Sillitoe 1988:70-72), hitting animals several times across the bridge of the snout. They singe off their bristles over fires and butcher them following a standard procedure which involves removing a strip of belly pork, breaking open the rib cage to remove internal organs and peeling the chest flesh away to give two sides of pork, each with a front and rear leg attached. They invariably cook pork in earth ovens with tender young tree fern fronds, distributing the cooked meat to relatives and friends.

Pigs

The Papuan Native pig, a relatively short and stocky animal, has a conspicuous coarse bristle coat, the Agouti pattern being the dominant colour, with striped piglets. The bristles are prominent along the spine, frequently standing erect in adults, running mane-like from between the ears down the back and earning the animal the name of 'razorback pig' (Vayda 1972:905). When adult, pigs stand about sixty centimetres tall and may weigh upwards of seventy-five kilograms. The zoological identity of the Papuan Native pig has been subject to taxonomic dispute. The majority of writers identify it as *Sus scrofa*, the widespread 'Common Wild Boar', sometimes adding the subspecies name *papuensis* to differentiate it from its European and Asian cousins (Baldwin 1978:23, 1982:41; Rose 1981, 1982; Hughes 1970:277 - citing Laurie and Hill 1954:86). Following a thorough review of the evidence, including a multivariate analysis of skull data, Groves (1981:66) concludes that the Papuan Native pig is a hybrid of two species *Sus scrofa vittatus*, the 'Banded Pig' and *Sus celebensis*, the 'Sulawesi Warty Pig'. This interpretation of the evidence probably reflects the influence of human activities over the millennia on the island's pig population, people bringing in animals from nearby Indonesia for breeding purposes. The population has not enjoyed the reproductive isolation necessary for species evolution. The wild and domestic pig populations remain today genetically continuous.

The notion of a breed is new, arriving with the introduction of exotic breeds to the Southern Highlands by government agricultural officers (*didiman*), from the 1960s onwards, with a view to stock improvement and commercial production (Malynicz 1971:72 1973a:20; Watt *et al.* 1977:13-14). The Wola call these introduced pigs *susu* (from the Pidgin term *susu pik* 'milk pig'- Malynicz 1973a:17), and point out that they differ from indigenous pigs. They have large ears, short stubby snouts, shorter legs and elongated rounded body profiles. They have a soft muffled grunt compared to the loud squeals of indigenous pigs and they are more sparsely bristled. People are impressed with the size to which these pigs can grow but few have ever owned one, some even seen one. The census data record none in the survey region at any time. They do not do well under local conditions; in Malynicz's

(1973a:20) opinion "the main factors restricting growth are under nutrition of all nutrients". The free-ranging local pig management regime soon results in cross-breeding between any exotic stock introduced into a region and local animals, giving rise to another new class of pig called *aumuw*. The appearance of these pigs varies depending on the proportion of their genetic make-up originating from the foreign breed. They have larger ears than local pigs and less bristly coats with less pronounced 'razorback' mane (no one has ever mentioned teat numbers). In short, the local non-concept of breed reasserts itself, any introduced pigs absorbed into the herd after a few generations without physical trace.

The work involved in herding pigs is not onerous. The daily routine is for a woman to release her pigs in the early morning to forage for the day in neighbouring fallow grassland and forest. Except troublesome pigs, which she may keep penned up or tethered on a rope. Sometimes women put animals in harvested gardens to feed on any remaining tubers and other crops. People say that pigs forage for earthworms mainly, which are necessary to lay down much fat (Rose & Williams 1983/84). In the late afternoon pigs are conditioned to return to the homestead. When they arrive they are fed their tuber ration. They spend the night in stalls, traditionally built at the rear of women's houses, although today many are housed in adjacent lean-to shelters in response to admonitions that living with pigs is dirty and unhealthy. (See Feacham 1973:25 and 1975 on environmental health hazards of pigs, notably to surface water supplies; and Watt *et al*, 1977:23-31 for an example of extension advice about appropriate housing.) Some women regularly manage more pigs than others and are admired for their ability, earning an appellative equivalent to 'big woman'; as with men this title carries no authority.

LITERATURE REVIEW

The Wola pig herding regime is similar to that reported in many other regions of the Highlands (Pospisil 1963; Feacham 1973; Rappaport 1968; Hide 1981; Boyd 1984). The free-ranging arrangement differs from that found in some more densely populated regions such as Chimbu and Tari where people often tether or pen animals during the day (Hide 1981:328; Rose 1976, 1982) and Enga where some communities use river flats enclosed by steep banks (Feacham 1973:27). This review summarises some statistics on pig herds and observations on management practices elsewhere in New Guinea for comparison with the data reported in this paper.

The statistics on pigs per person in New Guinea show considerable variation, probably reflecting to some extent fluctuation in herd sizes over time. Malynicz (1976:202) gave figures of 0.88 to 2.1 for communities in the Eastern and Western Highlands, Waddell (1972) 2.3 pigs per head and Feacham (1973:29) 1.1 to 3.1 per head for the Enga, and Baldwin (1978:23) quoted an upper figure of 2.5 for the Enga region, but Feil (1976:445) reported considerably more at four pigs per person. Rappaport (1968) gave a range of 0.3 to 0.8 for the Simbai valley, Boyd (1984:37) one of 0.55 to 0.7 for the Awa of the Eastern Highlands, and the Chimbu pig population according to Brookfield and Brown (1963:59) is "one grown pig per head: allowing for piglets, we might assume 1.5 adult pigs per head as maximum" (the Sinasina data of Hide (1981:407) agree with these figures). Longhouse communities of the nearby Etolo on the Papuan Plateau had between 0.52 and 1.39 pigs per person (Dwyer 1990:58-59), and among the Anga there are 0.5 pigs per head (Bonnèmere & Lemonnier 1992:140). For further statistics of pig populations in lowland and fringe highlands areas, see Dwyer (1993:134) and Kelly (1988:150, Table 2).

Statistics on size of litters are broadly similar throughout New Guinea. They are all on the low side. Malynicz (1976:204) recorded a range of 3.6 to 4.8. Hide (1981:460) reported that the mean Sinasina litter as 4.8 (for 23 litters), Boyd (1984:42) the mean Awa litter was 4.1 (for 15 litters), Kelly (1988:136) the mean Etolo litter was 5.6 (for 9 litters), and Pospisil (1963:203) the mean Kapauku litter as 6 piglets (for 8 litters). Many reports note high piglet mortality rates. The mortality rate in Kapauku herds is 27% (Pospisil 1963:207). In Sinasina herds it is higher, 42% of piglets dying (Hide 1981:453, 462). Eastern Highlands data suggest piglet mortality rates of 38% to 47% (Malynicz 1976:204). And on the Papuan Plateau, where the pig herding system is more extensive with domestic animals foraging in the forest alongside wild ones, 56% of young pigs die (Kelly 1988:137, 140). Farrowing sows sometimes die too; for example 5% of Etolo sows and 37% of Sinasina ones.

The statistics on growth rates are also on the low side. According to Malynicz (1970:201), the average weight of one year old pigs was 22.7 kgs and they put on 1.8 kg per month. Both Hide's (1981:473) and Rose's (1981) data confirmed these growth rates for Chimbu and Huli pigs; Sinasina pigs for example put on 1.6 kgs per month average in their first year, although their growth rates vary considerably from 0.9 to 2.2 kgs per month. These growth rates are considerably less than those achieved by exotic breeds under commercial conditions. Even when housed and fed under the same regime indigenous pigs grow

more slowly, putting on weight at only 0. 47 of the rate of Berkshires and Tamworths (Malynicz 1973b:25, Table 2). As Malynicz (1973b:24) observes "the indigenous pig is significantly slower growing, has a lower food consumption, a worse feed conversion ratio, and smaller eye muscle and back fat dimensions at an equivalent slaughter age". In another publication he suggests that this may confer a selective advantage, writing that "It is interesting to speculate that the low growth potential of native pigs is a fitness characteristic which may increase their survival rate under conditions of nutritional stress" (Malynicz 1973a:17).

Herds comprise animals from a range of sources. The Awa of the Eastern Highlands rely heavily on locally farrowed piglets, which comprised 69% of their herds, they also obtain animals by capturing feral piglets (Boyd 1984:29-34, 38-39). The Sinasina rely more on exchange and trade to supply pigs; one community's herd comprised 49% non-home produced animals, while another had considerably more with 44% coming from trade and 33% in gifts (Hide 1981:433-444). Hide interprets the difference in terms of pig festival cycles, after the work of Vayda *et al.* (1961) and Rappaport (1968), resulting in a system featuring long-term planning of pig production. "Trade plays a major part in rebuilding pig populations at the beginning of the cycle. As the proportion of pigs produced increases from under one quarter to over one half . . . the proportion traded decreases to level off at about one quarter, apparently remaining stable for the rest of the cycle. The interesting feature of the second half of the cycle is the suggested increase in the proportion of pigs acquired by gift exchange at the expense of produced pigs" (Hide 1981:442). The author attributed this difference to men restricting reproduction later in the cycle to ensure herds of large animals for slaughter at festival time: "a coordinated cycle of pig management culminating in a pig population composed mainly of large animals . . . implying the restriction, at some stage of the cycle, of reproduction" (Hide 1981:540).

There is a considerable literature on pig killing festivals in the Highlands (e.g. Ryan 1961; Rappaport 1968; Meggitt 1974; Sillitoe 1979; LeRoy 1979; Hide 1981; Feil 1984; Lederman 1986). Most of this literature related pig kill festivals to local politics. An often cited work is Rappaport's (1968) on the Maring, in which he postulates a homeostatic ecological relationship between pig killing, demography and human protein demands. There is no indication in the Wola data, nor has any person ever suggested to me, that there is any correlation between pig kill events and ritual and warfare. (Others have thoroughly criticised this argument and the data on which it depended [McArthur 1974, 1977; Friedman 1974, 1979; Bergmann 1975; Wagner 1977; Hide 1981:549-562], although the author tried to defend it [Rappaport 1977, 1984; Kelly & Rappaport 1975] and others widely cite it in studies of human ecology [e.g. Shantzis & Behrens 1973; Morren 1977; Bayliss-Smith 1982:25-36; Biersack 1999]). Neither is there any evidence in the Wola data of regular 'pig cycles'; Lederman (1986:176) also questions their existence in the Mendi valley. Viewed over several years, Wola pig kills are unpredictable events. The chaotic way in which they schedule them - requiring that a community agrees first that one is due and then featuring considerable wrangling as men strive to reach a consensus over timing - makes cyclic planning difficult (Sillitoe 1979, Rappaport (1968:158-159) on consensus formation among the Maring, and Lederman (1986:187-212) on the political dimension to timing of pig kills).

METHODOLOGY

The data on pig demography discussed here come from a series of surveys conducted periodically over twenty-four years in a part of the Was valley, with a population of 300 and 400 persons, giving a density of about 26 persons km^2. The sample comprised all households resident in the area, which so far as I can judge, is a typical community. The mobility of the population has presented some problems in handling these longitudinal data from one geographical locality. I have had to judge who was resident during any survey period. Some families maintain homesteads on other territories too and I have included their pig herds if they had resided in the survey region sometime during the previous twelve months or so. Beyond this I have counted them as living elsewhere and discounted their herds (some of these families have subsequently moved back into the survey region, others have departed permanently). Regarding men who have migrated elsewhere to work (e.g. Mendi or Hagen), I have counted them in if their families have remained in the region. If they have migrated as a family, I have treated them as families maintaining homesteads in two places and applied the twelve month rule (those who no longer maintain homes in the region and visit regularly I have discounted).

During the surveys all men in their late teens and older were asked a series of standard questions about the pigs in their herds at the time.[1] (The first survey was less detailed on animal size and classification than subsequent ones because I was unaware at the time of the many distinctions people make). The information for each survey

[1] I am grateful to Wenja Neleb for his assistance with these surveys.

results presented here. These data supply a reasonably comprehensive longitudinal picture of pig herd demography.

The men surveyed were asked at the start how many pigs they owned. They were then asked for each of these animals to specify its sex and status (e.g. an *injiy* sow, *saendapow* hog, or whatever). The Wola distinguish between pigs according to their sex and size. Small piglets of both sexes they call *hondba*, a term used for small animals generally. An intact boar is a *tuw* (literally 'testicles'), and a male piglet may be specified as a *tuw-hondba*. A hog or castrated male animal is a *saendapow*. A gilt or female animal that has not farrowed is a *way*, and a female piglet may in turn be designated a *way-hondba*. A sow is an *injiy* (literally 'mother'), again a term used for other animals, including humans. A large mature animal with prominent curling canine tusks is a *himalwaenk* (literally 'tooth-*waenk*'), which people sometimes convey in speech with a bent fore finger hooked into the cheek.

Some of these assessments depend more than others on subjective judgements. There is no clear cut distinction between larger male piglets and sub-adult boars which have not serviced sows, and the same animal may be classed by some people as a *hondba* piglet and by others as a *tuw* boar. There is a similar blurred line between female piglets and gilts, although it is statistically less significant because there are large numbers of animals in both classes, unlike males, very few of which remain intact and capable of servicing females for any time. The classification of large hogs as *himalwaenk* tuskers is also liable to subjective variation, the point at which the canines are sufficiently large and curled to put an animal in this class is debatable (some persons are given to over-exaggerate the status of such pigs).

Respondents were also asked to specify the size of the animals. The Wola have a range of adjectives to indicate size, such as *genk* 'small' and *onda* 'large', or appropriately qualified versions of these, such as *genk ora* 'very small' or *ondasha* 'largish', and so on. During the surveys we used seven descriptive classes to record the size of animals: *onda ora* 'very large', *onda* 'large', *ondasha* 'largish', *genksha* 'smallish', *genk* 'small', *genkden* 'smaller' and *genk ora* 'very small' (newborn piglet). Again these assessments depend on subjective judgements but people were found to give tolerably reliable estimates using these comparative terms. Initially, we tried to survey all herds in the presence of the animals for enumeration purposes but this proved too difficult to arrange. Nonetheless I completed many questionnaires in view of the pigs of an evening as they returned home, and people's estimates accorded well with my own. For analytical purposes I amalgamated the first two size classes into a single large category, the second pair into a medium category, and the last three into a small category.

The Wola also classify pigs according to differences in appearance, largely coat colour plus one or two other features, such as trotter type and tail character. The survey schedule asked about each animal's classification, recorded largely by coat colour (*bombray* 'black', *tindiltoba* 'piebald', and so on). Next respondents were asked how long they had owned each animal, in 'Christmas' years and moons (1977, 1978, 1983 surveys only). Again these data are somewhat subjective, being liable to memory error. But I was able to engage in limited cross-checking with earlier surveys for pigs owned over considerable time periods, memories becoming less reliable the longer the time. The list of questions included the name of the person responsible for herding the animal and her relation to the respondent. Finally, we took down details of how the person had obtained the pig (born to one of his sows, received in an exchange transaction such as a bridewealth or mortuary payment, through purchase, and so on), and for some pigs we were also able to note their subsequent disposal (slaughter, died of sickness, passed on in an exchange payment, and so on).

Between two of the surveys (early 1977 to mid 1978), I attempted to keep a record of pig movements in and out of herds. While I was aware of many of the events that changed pig holdings - such as pigs killed at funerals, pigs presented in exchanges, pigs slaughtered for 'business' (meat sale), and sows farrowing -- there were some that escaped my attention. An attempt was made to cross-check at the second survey and pick up on missed movements.

On one occasion during 1977, all men in the sample community were asked, together with their wives, about all the litters they could remember born to sows in their charge. These data depend heavily on memory recall of respondents, some of them going back in excess of forty years. They were asked for the numbers of piglets per litter, the number that survived to six moons, and whether the sow survived.

RESULTS AND DISCUSSION

Reproduction and Growth

According to the Wola, a sow is pregnant for three moons and farrows during the fourth, called *hondba maeray* (literally: off-spring carries); the

gestation period for Highlands pigs being 116 days (Hide 1981:457,citing Malynicz). At the time that she is due to farrow, a sow becomes restless and may wander off, seeking a suitable nesting site. It is usual for sows to build themselves a nest of vegetation, often away in the forest or nearby in a clump of *Miscanthus* cane grass, in which to farrow and suckle their young. Sometimes women lose track of sows at this time and have to search for them. They do not interfere but seek to lure sow and litter back home as soon as practicable with food. These practices are widespread throughout the Highlands (Malynicz 1970:201); the Sinasina for instance are careful not to disturb a sow that has recently farrowed (Hide 1981:460). The number of piglets in a litter varies from between one to eight usually. The average is between four and five (Table 1).[2]

The mortality rate is high with nearly one-quarter of piglets dying, and sometimes, farrowing sows too (according to these data 2.5%), which possibly deters some people from breeding, although they more usually refer to sows losing condition as a discouragement. The number of litters per sow is low. The survey of litters revealed an average of 4.2 litters per man. The numbers understandably increase with age (Table 2), the mean litter intervals suggest that men's herds average two litters a decade. If we assume that a man lives to old age, herding pigs for fifty years, this translates into a mean total of ten litters during his lifetime; the maximum number was a man in his sixties with three wives who had managed 27 litters between them (16 was the maximum number of litters managed by any women). Even allowing for memory failure, particularly for older men, these statistics are low and illustrate people's somewhat reticent attitude to pig production (i.e. the ambivalence that many express to servicing sows, knowing that they will lose condition and surviving piglets take a long time to reach a valuable size).

Table 1. **Pig litter statistics**

Total No. Litters	Total No. Piglets	Mean Litter Size	S. E.	No. Piglets Surviving to 6 mths	Piglet Death Rate	Sow Death Rate	No. Men Surveyed	No. Men Reporting No Litters	Mean No. Litters Per Man	S. E.
321	1522	4.74	0.10	1189	22%	2.5%	77	12	4.17	0.54

Table 2. Pig litters according to men's ages

Age	No. Men	No. Litters	Mean No. Litters Per Man	S. E.	Total No. Piglets	No. Piglets Surviving	No. Sows Dying
<20 yrs	7	3	0.4	0.3	12	6	
20-29 yrs	26	54	2.1	0.3	278	208	1
30-39 yrs	21	94	4.5	0.9	411	311	
40-49 yrs	17	108	6.4	1.1	522	406	7
50-59 yrs	4	48	12	5.9	240	204	
>60 yrs	2	13	6.5	4.5	58	54	

Difference significant (av. litters): $\chi^2 = 15.50$ (d.f. = 5, $\alpha = 0.05$).

[2] These are low compared to litter rates elsewhere in the tropics, particularly commercial ones

These data suggest a low reproduction rate. The Wola say that some sows make better mothers than others with higher piglet survival rates and larger litters. People may breed more than average – that is, three or more litters - from such sows, hanging on to them until their fertility declines, whereas they dispose more readily of others. The interval between litters is long, sometimes years, for those sows that breed more than once.

The principal concern of pig keepers is to promote animals' rapid and healthy growth. According to the Wola the rate at which pigs grow varies, as does the final size they reach when fully grown, the same as human-beings, they point out. Some piglets grow very rapidly at first but develop more slowly in adolescence, others are slow starters but race away when adolescent, and so on. Some animals remain *dimb* 'diminutive' all their lives and these runts never seem to grow beyond the size others reach during adolescence. Others develop into large *himalwaenk* 'tuskers' with thick fat on their bodies, particularly *saendapow* hogs that not only grow faster than females but also on the whole attain larger sizes when adult. The sexual dimorphism is marked if a female farrows, sows losing weight and condition - Sinasina data show reproducing sows losing 0.2 kg per month (Hide 1981:474). It can take animals some time to regain their weight, which deters people from arranging for them to breed (Malynicz 1976:208 notes the Chimbu prevent breeding to ensure sows grow).

The variation in development makes it difficult to specify growth rates and adult size of animals – the specification of rates would demand the measuring and weighting of a sample of pigs at intervals over several years, data that I have been unable to collect. Sows may have their first litter at about two years when sub-adult (Sinasina pigs likewise do not breed until they are 18 to 24 months old - Hide 1981:452). They attain their final size at about six years (this rate of development compares with that reported by Malynicz (1976:Table III) for Eastern Highlands herds). Sizes and weights of pigs measured ranged from two month old piglets that averaged 45 centimetres long from tip of snout to base of tail and weighed between 3 and 4 kgs, to large males, measuring some 1.4 metres and weighing up to 130 kgs[3]. The natural life span of a pig is twelve to sixteen years, although few live this long, except for good breeding sows that may farrow upwards of three times, which people may be reluctant to slaughter.

Nobody has ever suggested to me that one might take a sow that has grown rapidly into a large adult and cross it with a boar that is growing quickly to breed a litter of fast growing offspring with the potential to achieve heavy adult weights (see Dwyer 1996 for a cross-cultural discussion of pig breeding practices in New Guinea). When I try to discuss the idea of selection, some persons usually point out that the piglets in any litter vary in their rates of development and adult size. There are dominant ones that may grow quickly into large animals and there are runts that fail to develop to full adult size, regardless of parentage. Furthermore, breeding with juvenile boars makes it difficult to select with any certainty a sire according to growth potential, because overall growth rate and final size are difficult to estimate, particularly as castration impacts noticeably on these traits.

Pig Herd Demography

The average size of a man's herd is 4.3 animals, ranging in surveys from one to twenty-seven pigs. The average number of animals in a woman's charge is lower at 3.3 animals, ranging from one to sixteen pigs. Men call on several female relatives, including unmarried and widowed kin, to assist with pig herding. If we take all men in the samples, including those with no pigs, the average size of men's herds falls close to that of women's at 3.4 animals. The composition of these average herds according to size of pigs is as follows:

Table 3. **Mean numbers of pigs owned**

	Large Pigs	S. E.	Medium Pigs	S. E.	Small Pigs	S. E.
Men	1.1	0.09	1.6	0.11	1.6	0.16
Women	0.9	0.12	1.2	0.24	1.2	0.15

These statistics compare with those reported elsewhere; Crittenden (1982:274) for example reports an average of 2.9 to 6.3 pigs per household on the nearby Nembi Plateau, Brookfield and Brown (1963:58-59) an average of 2 to 4.5 animals a family among the Chimbu, and Hide (1981:319) gives an average of 3.5 pigs per household for the neighbouring Sinasina.

These averages conceal the fluctuation that occurs in pig herds. These are in a state of constant flux, not only as animals are born or die or

[3]These weights are estimated from girth measurements, using Hide's (1981:647) very useful conversion table (Dwyer 1993:125 has an equation to estimate pig weights)

the occasional one runs wild, but also as their owners give and receive them in exchanges with one another and intermittently slaughter animals. Figure 1 gives some indication of the fluctuation that occurs in pig numbers. The demographic data suggest that when herds are at their maximum extent they parallel the human population with one pig for every man, woman and child, and fall to nearly 0.5 per capita at their lowest levels. The graph marks the principal events responsible for the falls in numbers, which were large communal pig kills (Sillitoe 1979) and a severe drought. The fluctuation is expected given the numerous reports from across the Highlands of festivals at which people kill large numbers of pigs. Others have documented similar population movements elsewhere (see Hide 1981:405-18 for a sophisticated reconstruction of herd recovery following festival slaughters among the Sinasina). The drought induced fall is also expected given the periodic occurrence of devastating shortfalls in food supply across the region (see Sillitoe 1996:73-102 on the occurrence and consequences of these in the Wola region), although the magnitude is salutary, paralleling a pig kill.

A look at the structure of herds, according to the gender and age status of animals (*injiy* sows, *way* gilts, *saendapow* hogs and so on), reveals that *way* gilts predominate among females and *saendapow* hogs among male animals (Figure 2). The number of piglets of either sex are approximately equal, and similar to the number of *injiy* sows in a herd. Table 4 indicates that while the composition of the herd varies over time, the structure remains broadly constant regarding the proportion of different classes of animals. Gilts predominate among females and hogs among male animals whatever the size of the herd (Table 4). It is the proportion of piglets to adult pigs that shows the most marked variation, which is understandable with the periodic mass culls that characterise pig herd management.

After a pig kill the proportion of *hondba* piglets in the herd goes up by some ten percent, from around one-quarter of the herd to one-third (Table 5). Of the adult animals, it is the number of *injiy* sows that shows the largest proportional change, at seven percent, suggesting that pig

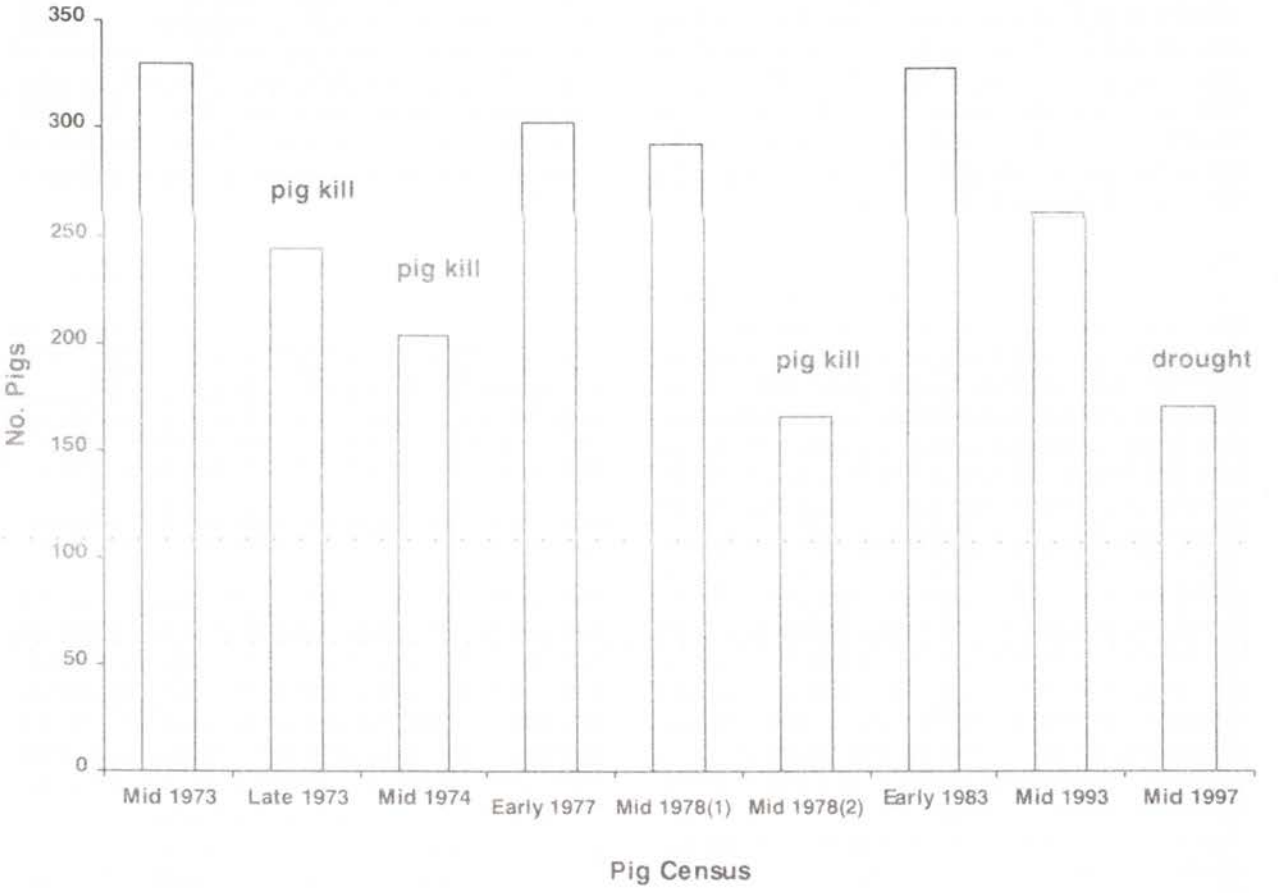
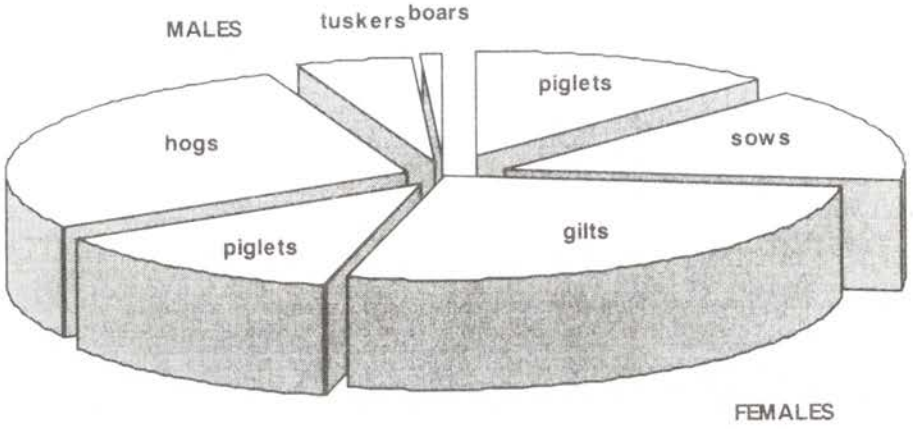


Figure 1. **Pig population at time of survey over twenty-four year period.**

Figure 2. **Mean composition of pig herds according to pig classes (all data ex. 1997)**



kills mark the culling of large numbers of aging sows from a herd. The percentage of *himalwaenk* tuskers killed is also predictably large, although the numbers of animals involved is fewer. None of these changes in herd composition are statistically significant. The proportion of *way* gilts and *saendapow* hogs remains similar at around one-quarter of the herd, although the numbers of these animals slaughtered is large. I estimate that a herd returns to normality within about one to two years. These findings are similar to those reported elsewhere - at a small Sinasina event people "killed almost equal numbers of males and females thus showing no tendency to keep females for breeding" (Hide 1981:487).

The data suggest that a prolonged food shortage, from a drought not only reduces the size of a herd as after a pig kill but also impacts on its structure in a different way, and potentially devastatingly for the recovery of the herd. A review of pig populations according to the size of animals (which predictably parallels the gender-age discriminations) shows graphically the difference (Figure 3, Table 6). After pig kills the number of large animals in a herd declines noticeably. This is expected, people killing many mature animals carrying a lot of fat and meat for distribution. During the El Niño event of 1997 (when the reversal of Pacific currents affected rainfall patterns), the reverse happened and the number of small pigs in the herd declined dramatically. When such a food shortage occurs people say that they reduce the rations fed to pigs, even stop feeding them altogether. The animals come into direct competition with humans for the limited food available (people eating small and substandard tubers usually fed to pigs). Small animals, particularly piglets, will be the first to weaken and die as sows dry up. Also during a drought, the low levels of nutrition will contribute to the fall in piglet numbers as the fertility of sows declines.

All pigs lose condition and weight in a severe drought, and many may eventually die. People deny that they systematically kill pigs in these times, although when food is short people may decide to stage a pig kill to reduce the burden (the 1974 kill was prompted in part by such a shortage[3]). This is contrary to the suggestion that pigs may serve as a food store, buffering people against lean times, and that large pig kills serve to take the pressure off when herds burgeon in extended good times (Vayda *et al.* 1961; Vayda 1972; Rappaport 1968:64-68). One of the Sinasina pig populations closely documented by Hide (1981:417) also evidenced an "oddly top-heavy structure" with few young pigs, which the author argues resulted because people stopped pig breeding to allow sows to fatten up for a festival slaughter. "The major husbandry goal prior to a festival is the production of large pigs for slaughter. Continuation of normal reproduction, implying numbers of small animals and thin sows, and the deflection of fodder for their growth to

[3] The food shortage in 1974 that hastened an already planned pig kill (Sillitoe 1979:257) was minor and impacted less on small pigs than the 1997 event when there were no plans for an imminent kill (these events take several months to negotiate, as participants have to settle outstanding exchange commitments).

Table 4. **Pig census data according to pig classes.**

Class	Wola Term	Mid 1973 (normal)	Late 1973 (kill)	Mid 1974 (kill)	Early 1977 (normal)	Mid 1978(1) (normal)	Mid 1978 (2) (kill)	Early 1983 (normal)	Mid 1993 (normal)	Mid 1997 (drought)	Mean	S.E.
Females:												
Sows	*injiy*	38	24	18	68	58	18	64	33	20	37.9	6.8
Gifts	*way*	85	60	48	75	77	55	70	78	62	67.8	4.1
Piglets	*hondba way*	42	38	40	27	33	31	40	30	3	31.6	3.9
Males:												
Hogs	*san-dapow*	96	73	54	82	85	32	82	72	75	72.3	6.3
Tusker hogs	*himal-wank*	26	12	5	15	14	2	13	10	9	11.8	2.3
Boars	*tuw*	3	1	1	1	4	3	2	1	1	1.9	0.4
Piglets	*hondba tuw*	40	36	38	34	25	25	56	35		32.1	3.3
TOTALS		**330**	**244**	**204**	**302**	**296**	166	327	259	170	255.3	21.3

sizes still well below that sought, would hinder the achievement of this goal". He had no evidence of a fall in piglet numbers, although his fieldwork coincided with the large 1972 pan-Highlands drought – herd structure remained the same throughout (Hide pers. comm.). The Awa pig population reported by Boyd (1984:38,41) also had a top heavy structure at one point, attributed to low natural rates of reproduction due to falling numbers of feral boars in the adjacent forest to inseminate sows.

Pig herds probably recover slowly after a stressful natural event such as a drought, whereas following a pig kill there are many small pigs to bring along and replace the large ones slaughtered (Table 6). After pig kills almost one-half the herd comprises small pigs, whereas normally they make up somewhere around one-third of the herd and in drought considerably less. The proportions of medium sized pigs remain comparable in herds at normal times and herds after pig kills, at 34% to 39% respectively, but they increase in drought to over 60%. The proportions of large pigs are the reverse of the piglet pattern, increasing from 15% following a pig kill to 29% under normal conditions and 37% during a drought. All of these variations are statistically significant with high residual values (Table 7). The standard demographic bar graphs show the situation in normal times and following pig kills (Figures 4 & 5). For comparative demographic pyramids of Sinasina pig herds see Hide (1981:415-416), Awa herds see Boyd (1984:38), and herds in the Eastern and Western Highlands see Malynicz (1976:203). During the interval between pig kills, herds develop an atypical demographic structure which reflects the Wola practice of keeping adult pigs alive for long periods of time once they reach maturity and not, as in commercial farming, killing them for sale and consumption. Instead of the usual demographic pyramid we have a rectangle, with some tendency towards a pyramid on the male side, reflecting the readiness of people to slaughter these animals in preference to breeding females when a pig is required between kills, for example at a funeral feast (a trend noted by Boyd (1984:40) too among the Awa; see also Malynicz (1976:203) whose graph of a Kerowagi pig population evidences a similar structure). Immediately after a pig kill the population structure more closely approximates to a pyramid, particularly on the male side; the difference with the female side again reflecting breeding concerns, people keeping more medium sized females to serve as sows in the immediate future.

Table 5. **Composition of normal pig herd and after pig kill according to pig classes**

	Normal Herd (mid 1973, early 1977, mid 1978 (1), early 1983, mid 1993)			After Pig Kill (late 1973, mid 1974, mid 1978 (2))		
	Mean No. Animals	S. E.	Percent	Mean No. Animals	S. E.	Percent
Females						
Sows	52.2	7.1	17.2	20.0	2.0	9.8
Gilts	77.0	2.3	25.4	54.3	3.5	26.5
Piglets	34.4	2.9	11.4	36.3	2.7	17.8
Males						
Hogs	83.4	3.8	27.5	53.0	11.9	25.9
Tusker hogs	15.6	2.7	5.2	6.3	2.9	3.1
Boars	2.2	0.6	0.7	1.6	0.7	0.8
Piglets	38.0	5.1	12.6	33.0	4.0	16.1

No significant difference: $\chi^2 = 4.47$ **(d.f. = 6,** $\alpha = 0.05$**).**

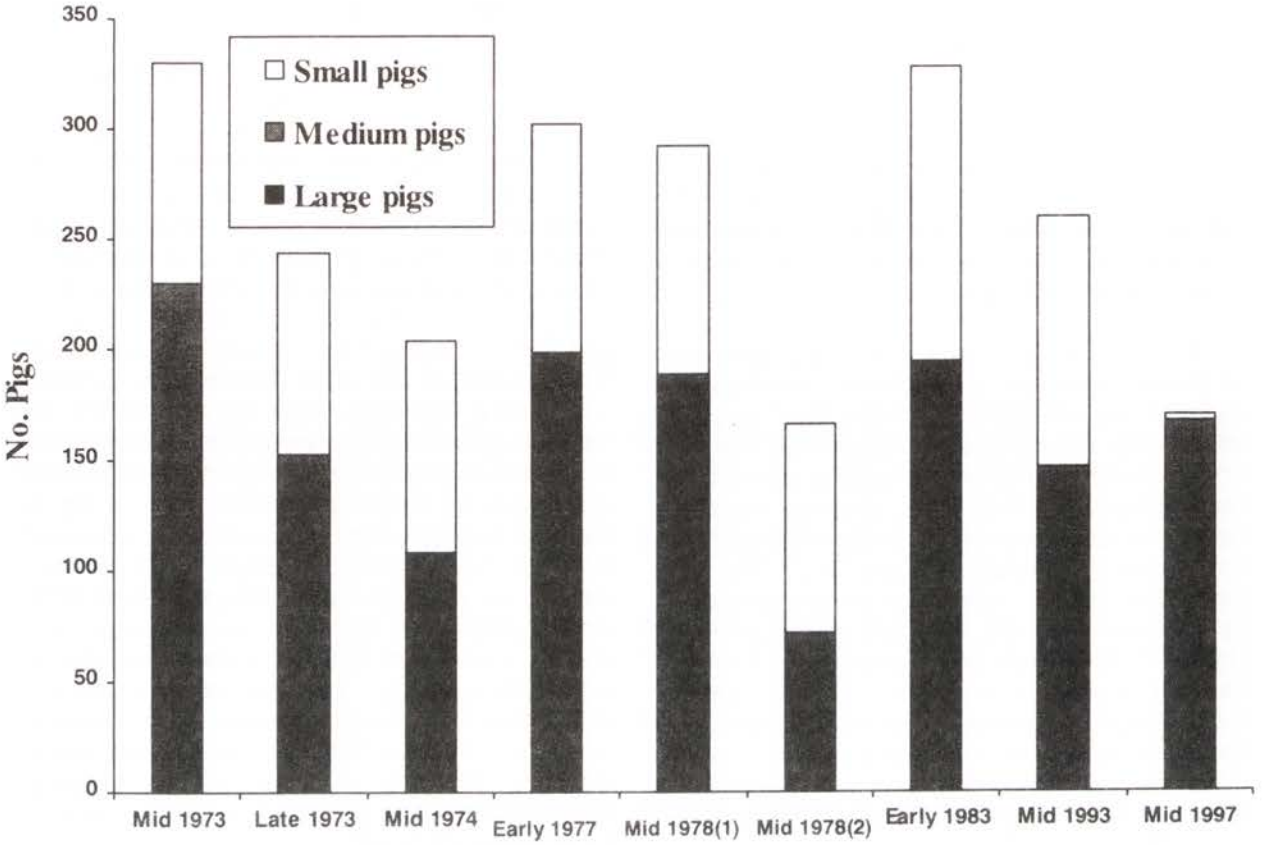


Figure 3. **Pig populations by size classes**

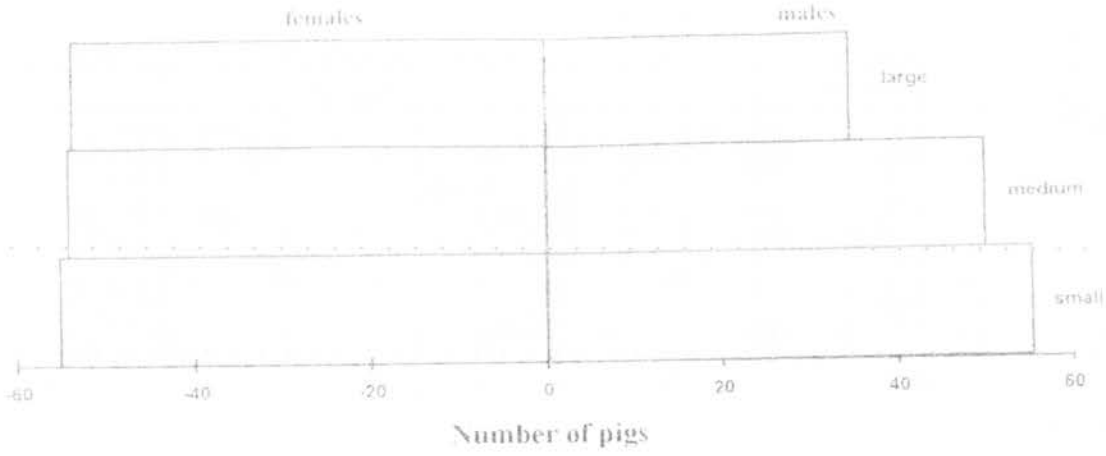


FIGURE 4. Mean demographic structure of pig population (between kills – mid 1973, early 1977, mid 1978 (1), early 1983, mid 1993)

Figure 5. **Mean demographic structure of pig population (after kills - late 1973, mid 1974, mid 1978 (2).**

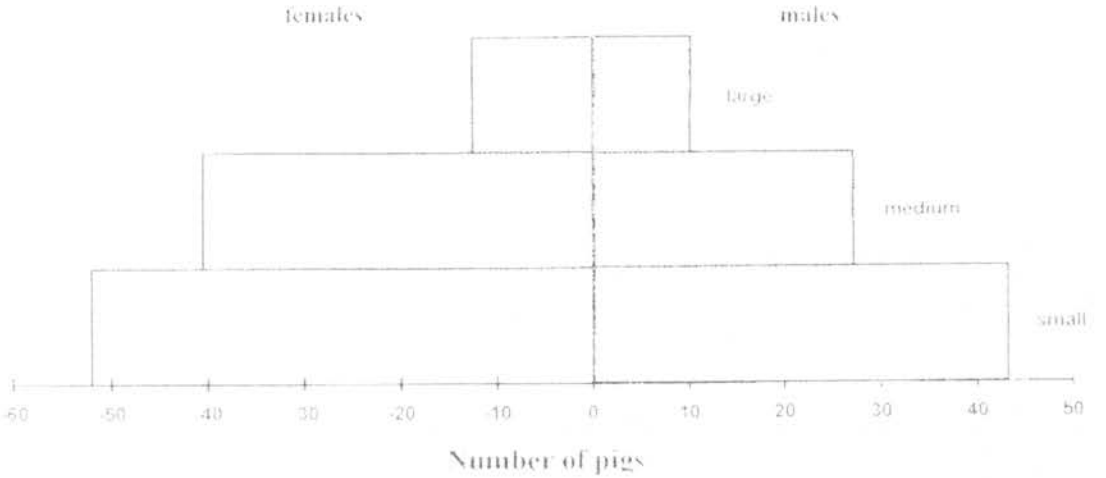


Table 6. **Pig census data according to size of pigs.**

Pig Size Classes	Wola Term		Mid 1973	Late 1973	Mid 1974	Early 1977	Mid 1978 (1)	Mid 1978 (2)	Early 1983	Mid 1993	Mid 1997	Mean	S. E.
Large	*onda ora & Onda*	F	52	25	13	51	48	12	58	60	26	38.3	6.4
		M	48	25	14	34	40	6	21	30	37	28.3	4.4
Medium	*onda sha & genk sha*	F	61	49	43	65	61	38	60	24	56	50.8	4.5
		M	69	53	38	49	44	16	55	32	48	44.9	5.0
Small	*genk. Genk-den & genkora*	F	52	48	50	52	59	54	56	57	3	47.9	5.7
		M	48	44	46	51	44	40	77	56		45.1	3.9
TOTAL			330	244	204	302	296	166	327	259	170	255.3	21.3

Table 7. **Mean composition of normal pig herd, after pig kill and in famine according to size classes.**

Pig Size	Sex	Normal Herd (mid 1973, early 1977, mid 1978 (1), early 1983, mid 1993)			After Pig Kill (late 1973, mid 1974, mid 1978 (2))			Drought	
Classes		Mean No. Animals	S. E.	Percent	Mean No. Animals	S. E.	Percent	Actual No. Animals	Percent
Large	F	53.8	2.3	17.8	16.7	4.2	8.1	26	15.3
	M	34.6	4.6	11.4	15.0	5.5	7.3	37	21.8
Medium	F	54.2	7.6	17.9	43.3	3.2	21.2	56	32.9
	M	49.8	6.1	16.4	35.7	10.7	17.4	48	28.2
Small	F	55.2	1.4	18.2	50.7	1.8	24.8	3	1.8
	M	55.2	5.8	18.2	43.3	1.8	21.2	0	0.0
TOTAL		302.8		100.0	204.7		100.0	170	100.0

Difference significant $\chi^2 = 60.13$ (d.f. = 6, $\alpha = 0.05$).

Pig Movements

It is not only at pig kills that people dispose of animals. The composition of the herd in any community constantly changes as people dispose of animals in various other ways. During an eighteen month period, when I attempted to keep track of pig movements in the herds studied (Table 8), the turnover rate was 55% (i.e. people still had in their herds 45% of the pigs they had at the beginning of the survey period). The total number of animals involved was 525, and of these 229 were disposed of at some time during the eighteen months and 223 were acquired during that period - 28% of these latter were both acquired and disposed of during this period (i.e. they were not owned at either the beginning or end of the survey but passed through the herds).[7] A pig kill occurred within one month of the end of the survey and the turnover rate shot up to 86% (only 14% of the pigs in the herds at the start of the survey remained). And the percentage of animals acquired during the period and subsequently disposed of also increased to 44%, reflecting again the dramatic impact pig kills have on herd composition.

Other data on how long pigs are in herds evidence similar patterns over time to these findings for eighteen months. During an interval of three years between surveys, when pig kills occurred (late 1973 to early 1977), the number of pigs remaining in herds throughout was 11%, and after an interval of four and one-half years (by mid 1978), it was down to 2%. Other data, on the time for which people had owned the pigs in their herds (Table 9), give a further indication of the rate at which their composition changes. (Compare Table 6.1 in Lederman [1986:204] on time pigs owned in Mendi valley.) There is a predictable steady decline with time: some 45% of animals remain in peoples' herds for one year or less; 23% for between one and up to two years; 14% for between two and up to three years; and then 9%, 6% and 2% for the next three years respectively.

It is of interest to consider how people dispose of pigs, other than slaughtering them in large kills, and in what proportions (Table 8, Figure 6 - compare Dwyer [1993:130-132] who gives details of how the Kubo disposed of pigs over a fifteen month period.). The largest proportion, at 18%,

[7] Table 7 documents only the source and disposal of the pigs in herds at the start of the survey, plus those animals acquired and disposed of during the survey period, a total of 365 pigs (it excludes those acquired during the eighteen months and still in herds at the end of this time). The data on herd composition at the start and end of the survey period is comprehensive, but it is probable that I failed to document all the animals that passed through the herds during this period. See Boyd 1984:40-47 for comparable data on an Awa community's herd over a twelve month period.

[8] I use the term foster in preference to agist (cf. Hide 1981:418-33) customarily applied to the pasturing of others' cattle for a sum. (Lederman 1986:211 also points out that agistment is an inappropriate gloss for similar practices in the Mendi valley).

DISPOSAL	SOURCE																					
	Bridgroom	Exchange	Bridewealth exchange(*injiykab*)	Caught as wild piglet	Compensation for shot pig	Crop harvest payment	Dept payment (*saen*)	Foster pig (*maha*)	Garden clearing payment	Gift	Inherited	Litter	Mortuary exchange (*ol tobway/ol bay*)	Mourning exchange (*gwat*)	Pig herding payment (*hentiya*)	Purchase (*showmay hesay*)	Reimbursment exchange (*haypuw*)	Reparation exchange (*showmay enjay*)	Side of pork payment	Sire payment (*tuwshiy*)	Swapped	**TOTALS**
Bridgroom exchange (*hogol*)		7				1	2						1									**11**
Bridewealth exchange (*injiykab*)							3	3		1		8	3	1		3				1	1	**24**
Compensation payment										1												**1**
Crop harvest payment												1										**1**
Dept payment (*saen*)												1										**1**
Foster pig (*maha*)						1						15	1			2	1					**20**
Foster disputed & reclaimed		1						3				5	1									**10**
Funeral feast (*hombera*)		1						3		1	2	1	1									**9**
Garden clearing payment												1										**1**
Gift (*ponay*)												15										**15**
Inherited														1		1						2
Killed & eaten by family								1				2				2						3
Killed & pork sold		1						2				2										7
Killed by other's sow, sold carcase													1									1
Lost at cards												1										1
Mission Feast	1							4				3	1									10
Mortuary exchange (*ol tobay/olbay*)		4			1		1	1		2		4		1								15
Mourning exchange (*gwat*)						1	1	1				4		1		1						9
Pig herding payment (*hentiya*)															1	1						2
Ran wild & shot for funeral feast													1									1
Reimbursement exchange (*haypuw*)		1																				1
Remained in hand	3	10				1	3	51	1	3		32	6	4	1	14	1	1	4	1		136
Reparation exchange (*komb*)								1			1	1										3
Shot damaging garden, pork sold										1			1						1			2
Sick, family ate	1						1	3				26	1			1						34
Sick, pork sold		2	1																			3
Sick, pork buried, feared infected												5		1								6
Sire payment												5										5
Sold									1			12				3		1				17
Swapped					1								1			1						3
Unknown								1			2	6	1						1			11
TOTALS	5	27	1	2	4	11	74	2	9	5	150	20	9	2	29	3	2	6	3	1	365	

Table 8. Source and disposal of pigs during eighteen month period

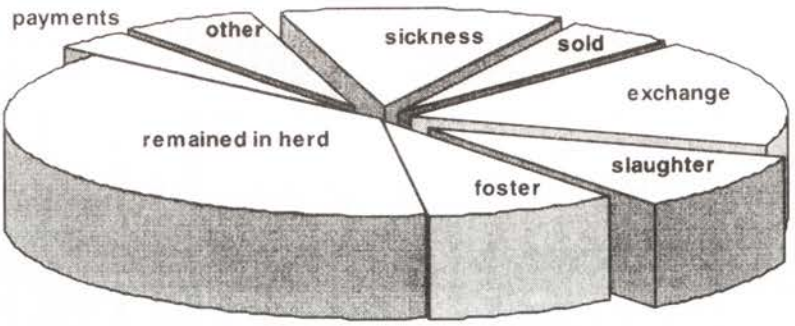


Figure 6. The disposal of pigs from herds (after Table 8, n=354, ex, unknowns)

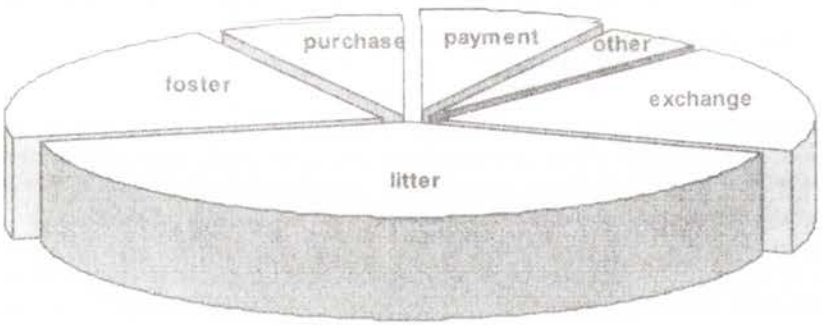


Figure 7. The source of pigs in herds (after Table 8, n=365).

Table 9. **Time pigs owned (1977, 1978, 1983 surveys)**

Months	Total	Percent
<1	36	3.7
1-2	40	4.2
2-3	55	5.7
3-4	72	7.5
4-5	100	10.4
5-6	33	3.4
6-7	49	5.1
7-8	14	1.4
8-9	17	1.8
9-10	4	0.4
10-11	11	1.1
11-12	4	0.4
12-18	136	14.0
18-24	84	8.7
24-30	76	7.9
30-36	63	6.5
36-48	83	8.6
48-60	57	5.9
60-72	18	1.9
>72	14	1.4
Totals	966	100

changed hands at socio-political exchange events (bridewealths, mortuary transactions etc.). The pie-graph indicates that a considerable number of animals -12%, - were lost to sickness either dying or slaughtered when ill. A fair number of pigs, some 9%, people fostered[8] with others, in a customary arrangement called *maha* where the recipient pays the giver when he in turn disposes of the animal (people usually receive such animals while small, commonly as recently weaned piglets, from a wide range of relatives, frequently close affines, and the usual arrangement is that the receiver undertakes in accepting the animal to make a payment to the giver when he gets rid of the animal). People slaughtered a similar – 9%- proportion of their herds, frequently in small feasts such as those that occur at funerals following interment. They sold 5%, and dispersed a further 3% in various payments, including assistance with tasks and debt repayments. And 6% they disposed of in various other contexts, as gifts, inheritance and so on.

The other side to pig movements is the source of animals in herds (Table 8, Figure 7 - compare Hide [1981:510] Figure 8.10 bar graphs of Sinasina pig acquisitions.) These fall into fewer classes. The largest number of pigs in herds - 41% - were 'home grown', coming from litters of sows owned. A considerable proportion of animals were foster pigs received from others, amounting to some 20% of herds. Exchange transactions were the next most common source of animals, these comprising 18% of herds. Next are animals purchased from others at 8% and, comprising a similar percentage, animals received in payment for services rendered and debt repayments. The final 5% came from miscellane-

Table 10. **Source of pigs in herds pre- and post- pig kill**

Source	Pre-Kill		Immediately Before Kill		Immediately After Kill		Post-Kill	
	No.	%	No.	%	No.	%	No.	%
litter	104	*34*	96	*31*	74	*42*	199	*52*
foster	76	*25*	89	*28*	48	*27*	62	*16*
exchange	63	*21*	69	*22*	28	*16*	51	*13*
purchase	29	*10*	25	*8*	8	*4*	20	*5*
payment	20	*7*	22	*7*	11	*6*	43	*11*
other	10	*3*	3	*4*	9	*5*	9	*3*

*Some of the totals in this table exceed the census counts because they include the herds of men living elsewhere in other communities who chose to come and take part in the pig kill.

Difference significant: $\chi^2 = 61.93$ (d.f. = 15, $\alpha = 0.05$).

ous other sources, including gifts and inheritance. There is no evidence that people prefer to trade for females to increase breeding stock, as Meggitt (1958:288) suggests for the Enga. The reverse is equally plausible, men seeking males that will fatten up more quickly and reach larger final weights. According to the data presented here, 55% of animals purchased in trade were male and 45% female (n=136 animals).

There is possibly some truth in the argument that pig kills effect some deliberate control over porcine demography, and reduce the number of large animals when the burden of their care is inordinately heavy (as Rappaport 1968:160-165 graphically argues for the Maring, where pigs destroy unacceptable numbers of gardens). But among the Wola these stresses appear to be a relatively short-term phenomenon exacerbated, if not precipitated by the promise of a forthcoming pig kill! When the community-wide consensus is that the time for a pig kill approaches, the event taking place maybe in a year or so time, men seek to augment their herds with large animals to slaughter. They rely on exchange opportunities and trade to build up their herds with large animals before a kill. Lederman (1986:204-5) observed the same behaviour in the Mendi valley, putting the case lucidly "people get a substantial number of the pigs they kill at the eleventh hour .... this is not the result of production constraints; it is a systematic social pattern generated by the rules of exchange and is one of the meaningful 'points' or goals of Festival activity". The increase in receipts of pigs through exchange observed by Hide (1981) among the Sinasina and discussed previously, may reflect something similar.

At a large pig kill observed in the Was valley, for example, men had obtained one-third of the 135 animals they slaughtered in only the previous twelve months. Some eighteen months before the kill 34% of herds came from 'home produced' litters and 31% from exchange and trade, and immediately before the kill these percentages had changed little to 31% and 30% respectively, the difference made up largely by foster pigs (Table 10). Immediately after the kill the proportion of 'home produced' animals in herds increased to 42% and those obtained in exchange and trade fell to 20%, as a result of men slaughtering a larger proportion of animals obtained in these transactional contexts than acquired in other ways. Some two years or so after another pig kill 'home produced' litter pigs still dominated. They comprised 52% of herds, an increase largely at the expense of foster pigs, the proportion of animals obtained through exchange and trade remaining nearly constant at 18% of herds. High residual values, for exchange and purchase pre-kill and for litters post-kill, confirm these trends statistically.

CONCLUSION

The people who feature in this paper practise a pig management regime typical of much of the Southern Highlands region. They allow pigs to forage extensively during the day with little or no supervision and return to homesteads of an evening where women usually feed them a sweet potato tuber ration. While people control the reproduction of animals, putting juvenile boars to sows, they do not practice selective breeding of stock. Indeed there is no local idea of breed, although people distinguish between animals, according to morphology and appearance. They maintain that pigs vary in growth rate and final size, including those from the same litter. The analysis of herd survey data reveals some interesting points about the structure and composition of pig herds, confirming many of the findings reported elsewhere. The mean herd size is three to four animals, but this is subject to wide variation. The demographic structure of herds can change considerably due to cultural demands, notably periodic community wide pig kills and pork exchanges, or natural events, notably occasional climatic perturbations resulting in food shortages. Herds may halve in size and the proportion of adult to immature animals change considerably, immature animals increasing following pig kills but falling during droughts. The other source of change in herd populations is the movement of live animals between them. Many pigs are fostered to others and significant numbers change hands in various payments and socio-political exchange transactions. The data suggest that herds turn over about once every five years, including kills. The demographic profile of herds, which is strikingly different to commercially managed herds, reflects the culture's socio-political exchange focus. People hang onto adult pigs for months, even years, commonly waiting for a communal pig kill to cull them.

The logic driving pig herd management and kills is as much transactional as demographic and nutritional. Herds may swell just before a pig kill, particularly with larger animals, and crash immediately afterwards but the evidence suggests that they return to 'normal' levels within a couple of years or so. While the population crashes documented for Wola herds, at between 26% and 44% of pre kill levels, are considerable, they are not as large as those reported elsewhere in the highlands, such as among the Sinasina and Maring where declines of 59% and 56% respectively have been recorded (Hides pers comm. Rappaport 1968:213-15). One explanation for the quick return of populations to 'normal' is that pig kills draw on a wider region than the community stag-

ing the event, the movement of large pigs resulting in a 'buffering effect'. After a natural calamity, on the other hand, such as an extended drought, herds recover more slowly because all the communities in a region are affected, unlike after kills which deplete herds in one locality at a time. These exacerbates the demographic effect of losing many young pigs. Pig kills are the high point of the socio-political exchange system. While people are reluctant to dispose of highly valued pigs piecemeal in small events, they willingly slaughter them in large ones to which hundreds of people come. These are truly grand occasions, celebrations of the exchange ethic, at which pork changes hands thousands of times as people repeatedly carve it up, meat sometimes passing between two, three of more persons before consumption.

The demands of exchange critically inform peoples' approach to pig management. They wish to handle many animals in large numbers of transactions, and slaughter several at periodic large pig kills and distribute large amounts of fatty pork. We might assume that these demands would translate into a desire to breed many animals. The requirements of exchange intervene in other ways, modifying any urge to breed pigs. The ready castration of young boars, many of them before they reach sexual maturity, reflects attitudes to breeding, leaving only two or three animals in any locality at a time able to service sows. Men with male piglets are more interested in turning them into rapidly growing and docile *saendapow* hogs than having breeding stock. Regarding *way* gilts and *injiy* sows, we might assume that keeping these as large adults is less wasteful in energetic terms than herding fully grown *saendapow* hogs because they will produce litters. Nevertheless many of these female animals are as unproductive as their large male equivalents because people are often reluctant to allow them to breed. When sows farrow they lose condition and weight, which dramatically reduces their value, and they can take many months to feed up again. A large fat pig now is more desirable for someone with his eye on current exchange commitments, than a skinny sow and litter of piglets that will take years to grow into valuable animals. It deflects men from animal production. The impact of this cultural logic is evident on pig herd demography.

ACKNOWLEDGEMENT

The author thanks Robin Hide for his extraordinarily close reading of this paper and also two anonymous referees for their very helpful advice and suggestions.

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