

LATE NEOLITHIC ECONOMY AT LAKESIDE SETTLEMENTS IN WESTERN SWITZERLAND

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Summary

In this paper we present a comparison of animal bone compositions at lakeside settlements of Western Switzerland. In the last few years new studies of animal bone material from sites on the Lake of Neuchâtel and the Lake of Biemme have greatly broadened our knowledge of the late Neolithic period, poorly known until now. Besides a chronological comparison, we examine the bone compositions of the sites around these two lakes according to topographic criteria. While the differences found in domestic and wild animal ratios are probably due to the different expanses of hunting grounds around the two lakes, the significant factor influencing the proportion of the domestic animal species is the topographical location of the settlements (flat or steep lakeside setting). Lakeside settlements with flatter hinterland normally show a greater proportion of cattle than sites located on the steep sides of the lakes, where often larger proportions of domestic pig were found.

Key Words

Lakeside settlements, Western Switzerland, Late Final Neolithic, Faunal remains, Topographical influence.

Résumé

Économies du Néolithique récent dans des sites lacustres de Suisse occidentale.

Cet article compare les spectres fauniques de sites lacustres de Suisse occidentale. Les récentes études des restes osseux animaux des sites du Lac de Neuchâtel et du Lac de Biemme ont grandement contribué à une meilleure connaissance des Néolithiques moyen et récent, mal connus jusque-là. En plus d'une comparaison chronologique, nous examinons les compositions fauniques des sites bordant ces deux lacs selon des critères topographiques. Alors que les différences observées entre les proportions d'animaux sauvages et domestiques sont probablement dues à la différence de taille des terrains de chasse présents autour des deux lacs, le facteur significatif influençant la proportion des espèces animales domestiques est la localisation topographique des sites (emplacements sur des berges plates ou en pente). Les sites lacustres avec un arrière-pays plat comportent généralement une plus grande proportion de bœuf que les sites situés sur les rives abruptes des lacs, où l'on rencontre souvent une grande proportion de porc.

Mots clés

Sites lacustres, Suisse occidentale, Néolithique récent, Faune, Influence topographique.

Zusammenfassung

End- und spätneolithische Ökonomie in Ufersiedlungen der Westschweiz.

Wir stellen in diesem Beitrag einen Vergleich der Tierknochenzusammensetzung in Ufersiedlungen der Westschweiz vor. In den letzten Jahren haben einige neue Untersuchungen an Tierknochenmaterialien aus Siedlungen am Neuenburger- und Bielersee unsere Kenntnisse zum End- und Spätneolithikum erheblich erweitert. Neben einem chronologischen Vergleich untersuchen wir die Knochenzusammensetzung der Siedlungen an diesen Seen nach topographischen Kriterien. Während die Unterschiede im Haustier:Wildtier-Verhältnis möglicherweise mit der unterschiedlichen Flächenausdehnung der Jagdgebiete um die beiden Seen zu erklären sind, ist für die Anteile der einzelnen Haustierarten die topographische Lage der Siedlungen - an flachem oder steilem Seeufer - entscheidend. Ufersiedlungen mit flachem Hinterland weisen in der Regel einen höheren Rinderanteil als die Siedlungen am Steilufer auf. In diesen konnten häufiger höhere Anteile an Hausschweinen festgestellt werden.

Schlüsselworte

Seeufersiedlungen, Westschweiz, Spät- und Endneolithikum, Tierreste, topographischer Einfluss.

Introduction

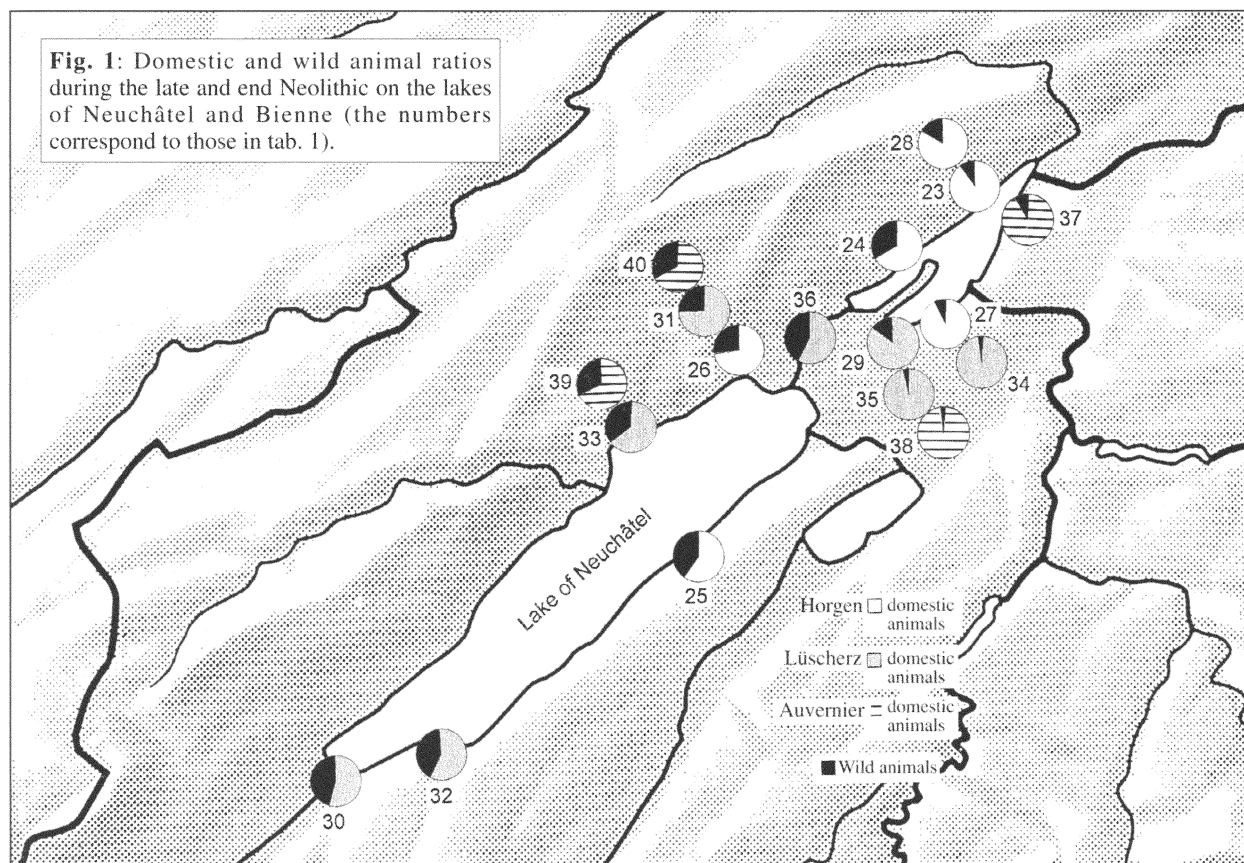
Since the last summarized presentation on animal bone compositions from Neolithic lakeside settlements of Switzerland by Schibler and Suter (1990), studies of a number of new animal bone complexes from various Neolithic sites in western Switzerland have been made, providing us with more knowledge. In the archaeozoologi-

cal department of the Seminar for Prehistory at the University of Basle, work has been conducted recently on the animal bones found at St-Blaise-Bains des Dames on the Lake of Neuchâtel as well as at several sites around the Lake of Biemme (B. Stopp, in prep; E. Marti-Graedel, in prep.; M. Glass, unpubl.). In addition, Yvonand IV (Clutton-Brock, 1990) also presents another newly studied

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Table 1: Examined sites of the Neolithic in Western Switzerland (*: the results of the excavation in 1986 are included).

N ^{os}	Site	Culture	Years BC	Domestic and wild animals Number of fragments	Bibliography
1	Egolzwil 3	Egolzwil	4350/100	2416	Stampfli, 1992
2	Yvonand III Niveau 1+2	Cortaillod	3800/100	225	Chaix, 1976 a
3	Twann Ensemble 1+2	Cortaillod	3838-3768	13979	Becker and Johannsson, 1981
4	Burgäschisee-SW	Cortaillod	3850-3750	4711	Josien, 1956
5	Auvernier-Port Vb-c	Cortaillod	3791-3785	1376	Chaix, 1985
6	Burgäschisee-Süd	Cortaillod	3760-3748	17419	Boessneck <i>et al.</i> , 1963
7	Twann E.3	Cortaillod	3702-3662	2957	Becker and Johannsson, 1981
8	Auvernier-Port Va	Cortaillod	3728-? 3679	1700	Chaix, 1985
9	Twann E.4	Cortaillod	3702-3662	450	Becker and Johannsson, 1981
10	Egolzwil 5	Cortaillod	3700/100	932	Stampfli, 1976 a
11	Twann E.5	Cortaillod	3649-3607	3840	Becker and Johannsson, 1981
12	Twann E. 5a	Cortaillod	3649-3607	8998	Becker and Johannsson, 1981
13	Yverdon G.-Martin 18-19	Cortaillod	3600	818	Chaix, 1976 b
14	Twann E.6	Cortaillod	3596-3573	988	Becker and Johannsson, 1981
15	Twann E7	Cortaillod	3596-3573	686	Becker and Johannsson, 1981
16	Yverdon G.-Martin 14-16b	Cortaillod	3588-3581	925	Chaix, 1976 b
17	Auvernier-Port III	Cortaillod	3627-3621/3560-50	963	Chaix, 1985
18	Twann E8	Cortaillod	3563-3532	1710	Becker and Johannsson, 1981
19	Twann E9	Cortaillod	3563-3532	1955	Becker and Johannsson, 1981
20	Twann UH	Cortaillod/Horgen	3405-3391	373	Stampfli, 1980
21	Nidau	Cortaillod/Horgen	3400	658	Glass, unpubl.
22	Lattrigen-Riedstation VI	Cortaillod/Horgen	3393-3388	6703	Glass, unpubl.
23	Twann MH	Horgen	3176-3166	979	Stampfli, 1980
24	La Neuveville-Chavannes	Horgen	3171-2979	878	Marti-Grädel, in prep.
25	Portalban/Les Grèves	Horgen	3171-3100	3650	Chaix <i>et al.</i> , 1983
26	St-Blaise/Bains des Dames Bl. 9	Horgen	3160-3120	937	Stopp, in prep.
27	Lüscherz-Neue Station "Binggeli"	Horgen	3156/55-3141	897	Marti-Grädel, in prep.
28	Twann OH	Horgen	3093-3074	1162	Stampfli, 1980
29	Vinelz-Areal Strahm 1960/86	Lüscherz	2853-2791	205	Stampfli 1965*
30	Yverdon-Garage Martin	Lüscherz	2800-2750	577	Chaix, 1976 b
31	St-Blaise/Bains des Dames Bl.7	Lüscherz	2800-2700	1707	Stopp, in prep.
32	Yvonand IV	Lüscherz	2800		Clutton- Brock, 1990
33	Auvernier Brise-Lames	Lüscherz	2792-2701	4287	Desse, 1976
34	Lüscherz-Dorf, Äusser Station	Lüscherz	2792-2709	646	Marti-Grädel, in prep.
35	Vinelz-Hafeneinfahrt	Lüscherz	2791-2703	5415	Marti-Grädel, in prep.
36	Pont-de-Thielle	Neol. recent	2789-2736	693	Chaix, 1977
37	Sutz-Rütte	Auvernier/Corded ware	2658-2639	1214	Marti-Grädel, in prep.
38	Vinelz-Alte Station	Auvernier/Corded ware	2657-2626	1316	Marti-Grädel, in prep.
39	Auvernier-La Saunerie	Auvernier/Corded ware	2640-2440	12148	Stampfli, 1976 b
40	St-Blaise/Bains des Dames Bl. 5-1	Auvernier/Corded ware	2550-2500	33143	Stopp, in prep.



site of this region. In this paper we present a new comparison of the animal bone compositions from the sites on the two lakes of Western Switzerland, including the results from recent studies.

All the recently examined sites date back to the final Neolithic period of the Horgen culture and the last Neolithic periods of the Lüscherz and the Auvernier/corded ware culture (tab. 1), for which poor archaeozoological information was available until now.

Besides a chronological comparison, we also took topographical criteria into account when comparing the animal bone compositions of the late and final Neolithic settlements around the two lakes. For the topographic comparison we have differentiated three topographical regions on both lakes (see fig. 1). One is the very steep northwest shore of the lower region on the Lake of Neuchâtel and alongside the entire left side on the Lake of Biemme. The second is the southeast lakeside with hinterland, which is flat on the Lake of Neuchâtel and rather hilly on the Lake of Biemme. And the third is at the inlets and outlets of the lakes, or rather, the region between the lakes where we can probably expect original conditions to have been marshy. These topographical factors deter-

mined the expanse and availability of pastures in the hinterland and therefore influenced the domestic animal husbandry.

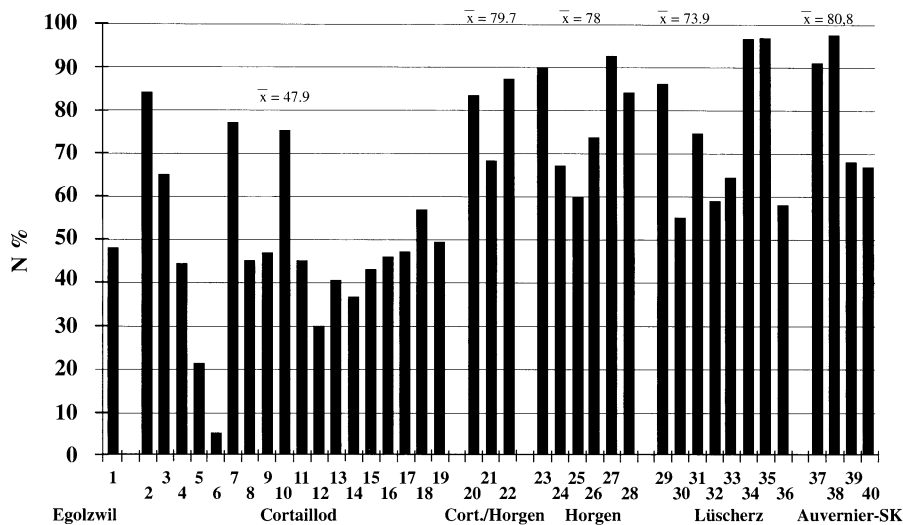
Comparison of the animal bone composition at lakeside settlements of the Jura lakes

As a quantifying method, we used the proportions of fragments because generally no information is available as to weights or as to the number of finds per area or volume. In accordance with Schibler and Suter (1990), we only considered sites with at least 200 identifiable bones.

The domestic/wild animal ratio

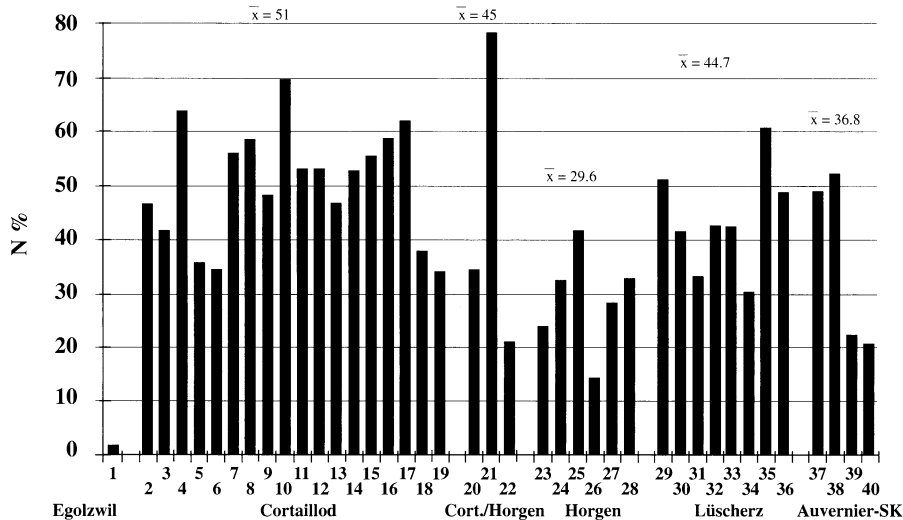
Chronological comparison (fig. 2)

In the course of time, an increase in the proportion of domestic animals is generally recorded. While the domestic/wild animal ratio between the sites of the Cortaillod culture fluctuates considerably, the proportion of domestic animals in the late and final Neolithic periods is on average visibly higher, comprising at least half of the identified bone material. The three sites in the transitional period of Cortaillod and Horgen, at around 3400 BC (tab. 1, n^{os} 20-22) also show high proportions of domestic ani-



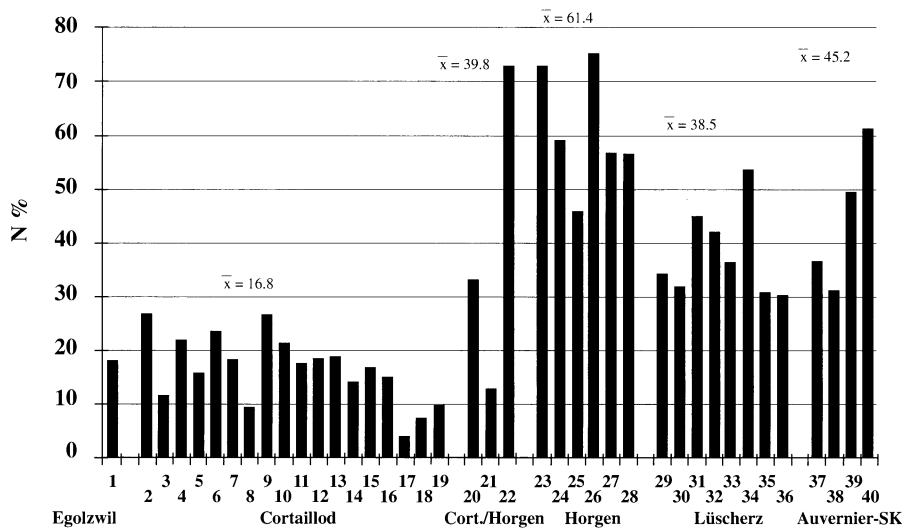
DOMESTIC ANIMALS

Fig. 2: Domestic animal proportions during the Neolithic in Western Switzerland. (The numbers correspond to those in tab. 1, \bar{x} = average value)



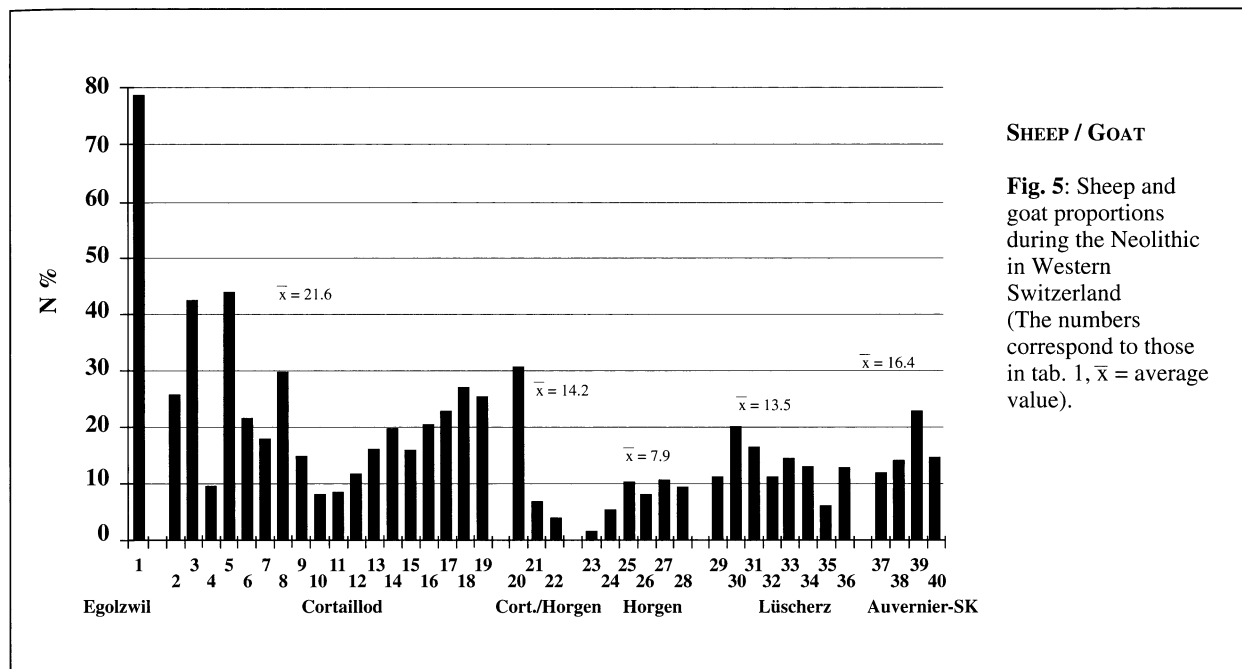
CATTLE

Fig. 3: Cattle proportions during the Neolithic in Western Switzerland. (The numbers correspond to those in tab. 1, \bar{x} = average value)



DOMESTIC PIG

Fig. 4: Domestic pig proportions during the Neolithic in Western Switzerland (The numbers correspond to those in tab. 1, \bar{x} = average value).



mals and, in this respect, correlate with the findings in the Horgen settlements.

The proportions of domestic animals at the late and final Neolithic sites show a fluctuation margin ranging roughly between 55% to 97% in all three cultures. These fluctuations cannot be explained chronologically, at least for the Horgen and Lüscherz cultures, as the sites were occupied more or less during the same time according to the datation by dendrochronology. By contrast, the differences in the bone compositions of the four Auvernier sites could be due also to chronological influences, beside geographical (two of them are situated on the Lake of Bièvre, the other two on the Lake of Neuchâtel) and topographical reasons (the two sites on the Lake of Bièvre belong to the flat southeastern shore, whereas the sites on the Lake of Neuchâtel belong to the steep northwestern shore). Both of the sites on the Lake of Bièvre (Sutz-Rütte, Vintelz-Alte Station) were inhabited during the same time period, whereas the datation of St-Blaise on the Lake of Neuchâtel is about 100 years later. Unfortunately there are only very uncertain dates available for the other site on the Lake of Neuchâtel, Auvernier-La Saunerie. So the different domestic animal proportions could be explained by a possible gap in time between the sites on the two lakes. Yet there is no archaeological indication for any cultural change.

Topographic comparison between the late and final Neolithic sites (fig. 1)

If we take a look at the topographic situation, there appears to be no relationship between the shore location,

i.e. flat or steep conditions, of the individual sites and the domestic/wild animal ratio (fig. 1). In all late and final Neolithic cultures, smaller proportions of domestic animals were found at the sites on the Lake of Neuchâtel than at those on the Lake of Bièvre (fig. 6, domestic animals). The settlements here (on the Lake of Bièvre) show a proportion of domestic animals ranging from 84% to 97%, regardless of the shore location and the different cultures, whereas the proportion of domestic animals at the sites on the Lake of Neuchâtel varies only between 55% to 74%.

The reason for this difference in the domestic and wild animal ratio between the two lakes is not quite clear to us. But it may well be that the settlers on the Lake of Neuchâtel, as opposed to those on the Lake of Bièvre, were surrounded by wider expanses of forests which presented a variety of hunting prospects during all late and final Neolithic cultures. The south side of the Lake of Bièvre, on the other hand, which stretches southward beyond a range of hills which once bordered onto a wet region ("Grosses Moos"), probably had smaller hunting grounds. Since there was no great need to hunt to ensure sufficient nutrition, there was no need to search for more favorable hunting grounds.

The proportions of the most important domestic animal species (cattle, pigs, sheep/goats)

In view of the great differences in the proportions of domestic and wild animals, we only use the bones of domestic animals as a 100% basis to compare the proportions of the individual species of domestic animals.

Chronological comparison (figs. 3-5)

In the course of time a slight average decrease in the proportion of domestic cattle is documented (fig. 3). Between the sites of the Cortaillod culture and those of the Horgen culture there is a massive drop observed in proportions of cattle. On the average, larger proportions are documented at the settlements during the Lüscherz culture and the Auvernier/corded ware culture.

By contrast, the proportions of pig increased successively (fig. 4). The drop in the proportion of cattle during the Horgen culture is clearly attributable to the rise in the proportion of domestic pigs which increased abruptly and attained the highest value in the Neolithic period. High proportions of domestic pigs are characteristic of sites dated to the Horgen culture all over Switzerland. These proportions are probably due to wide-ranging climatic changes which influenced domestic animal husbandry (see Schibler *et al.*, this volume).

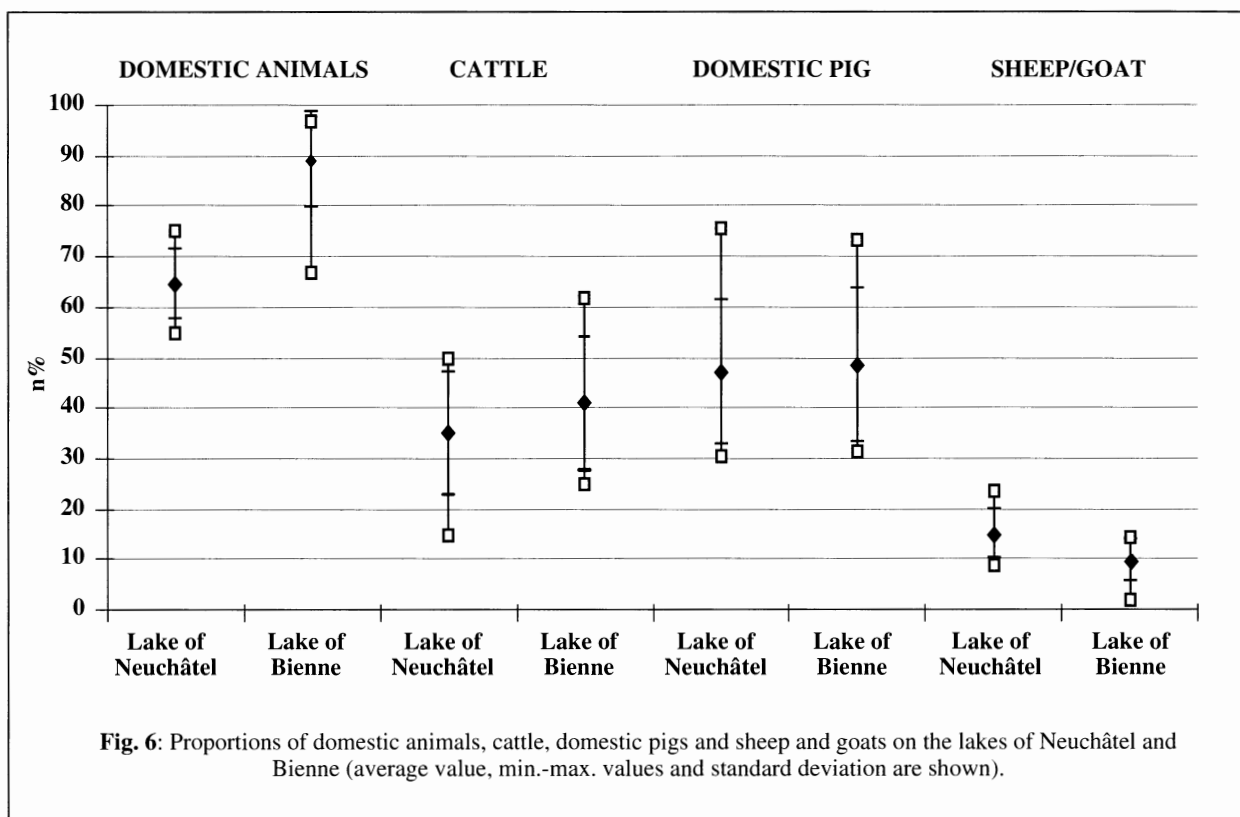
The three settlements in the transitional period of Cortaillod and Horgen, around 3400 BC, produced very different proportions of domestic pigs. The sites at Lattrigen-Riedstation (n° 22) and Twann-UH (n° 20) have a large proportion of pigs and correspond therefore to the Horgen culture; Nidau (n°. 21) with its smaller proportion

of domestic pig but with a high proportion of cattle, better corresponds to the Cortaillod culture.

With the beginning of the Lüscherz culture in the twenty-ninth century BC, the proportion of pig decreases again. This fluctuation in the composition of domestic animals is coupled with strong alterations in other categories of findings, so that here fundamental changes in settlement life must be expected (Gross, 1990).

During the Cortaillod period, partly until around 3400 BC (Twann UH, n° 20), sheep and goats as a rule were better represented than at the late Neolithic settlements (fig. 5). As early as in the transitional period between Cortaillod and Horgen, and especially during the Horgen culture, there are clearly smaller proportions documented which are replaced by higher average proportions in the subsequent late Neolithic cultures.

Besides these general tendencies in the proportions of domestic animals during the Neolithic period, there are always great fluctuations in the proportions of the individual species. In the late Neolithic cultures, the proportions of cattle and domestic pigs fluctuate from site to site by around 30%; that of sheep and goats by 10 to 15%. These differences are probably due to various natural environmental conditions around the settlements. These environ-



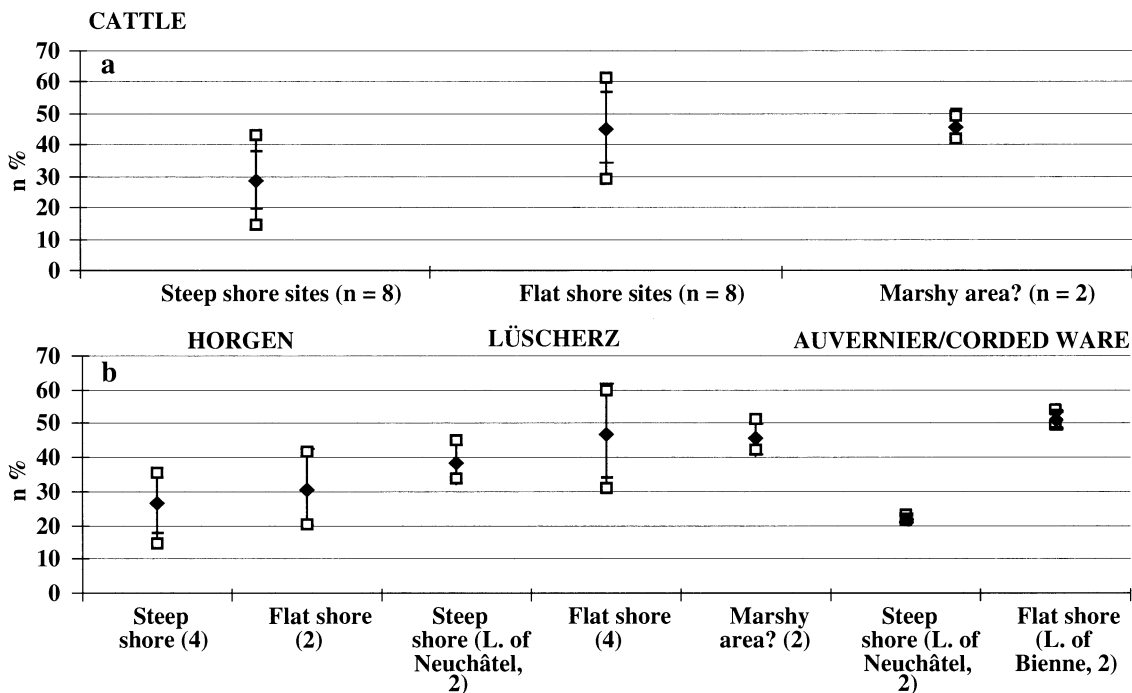


Fig. 7: Cattle proportions during the late and end Neolithic according to the topographical situation of the sites (average value, min.-max. values and standard deviation are shown): a) without cultural differentiation, b) with cultural differentiation.

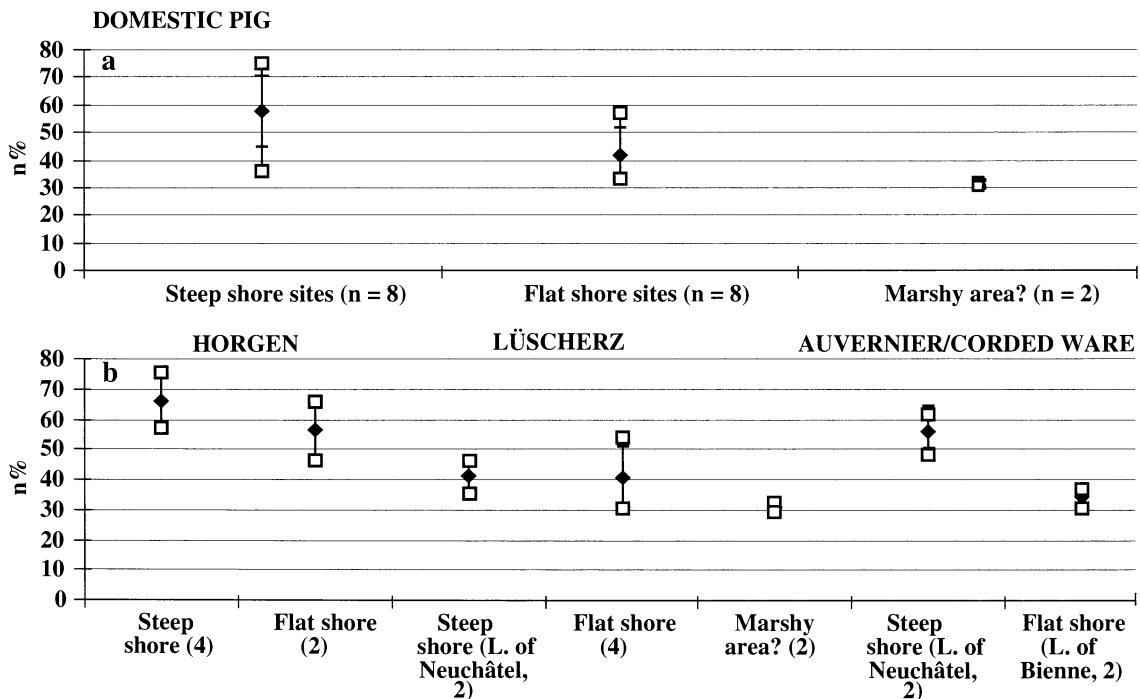
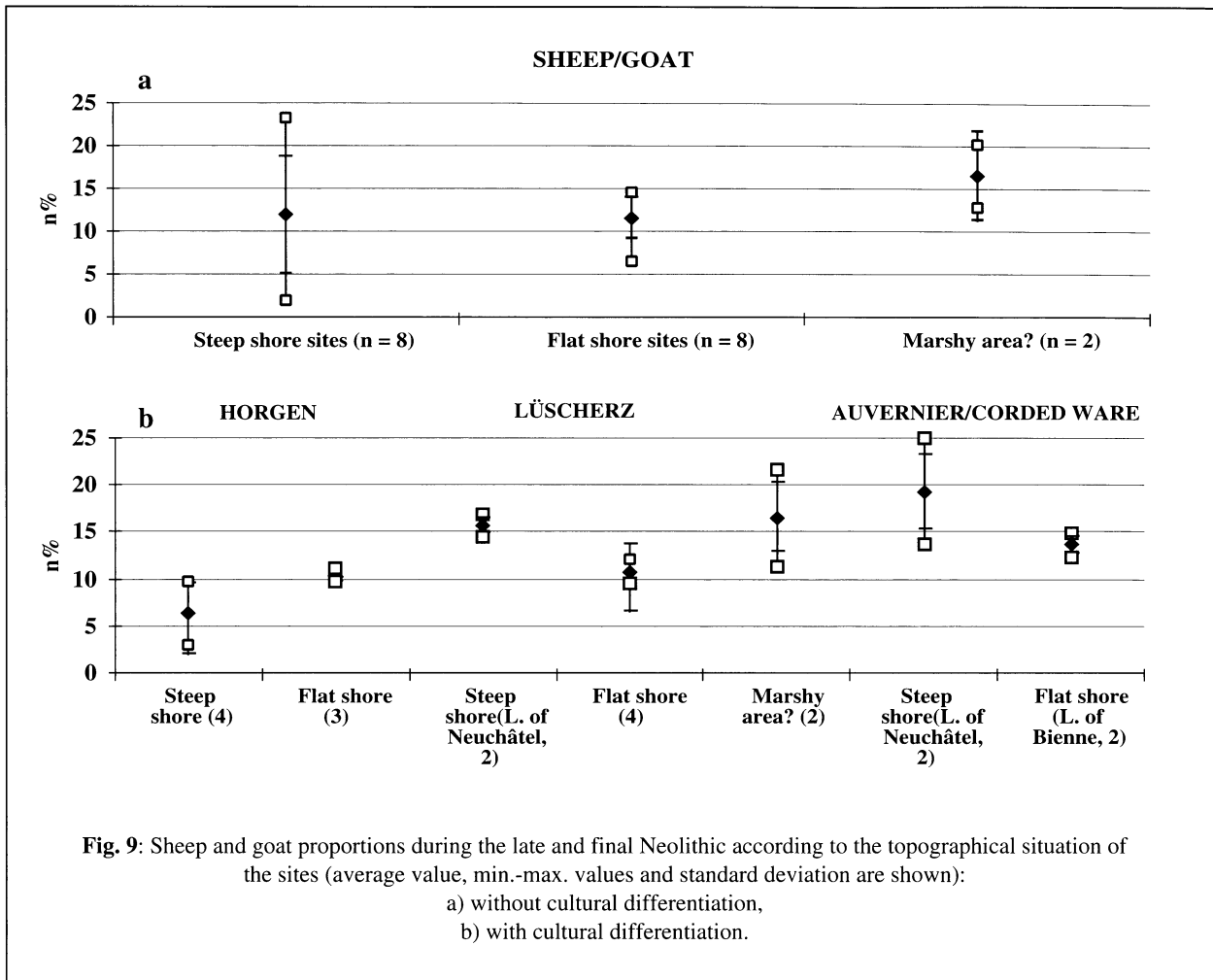


Fig. 8: Domestic pig proportions during the late and final Neolithic according to the topographical situation of the sites (average value, min.-max. values and standard deviation are shown): a) without cultural differentiation, b) with cultural differentiation.



mental factors should have been decisive for the different proportions of individual domestic animal species.

Topographical comparison of the proportions of individual domestic animal species among the late and final Neolithic sites (figs. 6-9)

Looking at the proportions of the individual domestic animal species with relation to lakeside location or the immediate surroundings of the settlement, certain patterns become evident. In contrast to the domestic and wild animal ratio, which is connected obviously with the lake the sites belong to, this is not the case for the proportions of the individual species (fig. 6).

In all late and final Neolithic cultures, the sites at the southeastern shore and at the inlets and outlets of the lakes (Yverdon and Thielle-Wavre) recorded higher proportions of cattle than the settlements on the steep northwestern shore (fig. 7). The difference between the average propor-

tions of cattle in the sites on flat and steep shores is over 10%. This is probably due to the fact that the sites on the flat southeast shore had more or less expansive hinterland, that offered more favorable pastures than the one on the steep northwest shore.

On the other hand there are higher proportions of pigs found at the steep northwest shore settlements than at the flat shore sites (fig. 8). This is especially the case during the Horgen and Auvernier cultures. According to archaeobotanical studies, the steep shore was covered with oak forests and the conditions were ideal here for pig fodder (forest pastures). During the Lüscherz culture however, the difference in the proportion of domestic pig between steep shore and flat shore sites seems to be not that significant. Two settlements on the southeast shores, Yvonand IV and Lüscherz-Äussere Station (nos 32 and 34) show high proportions of pigs. In the case of Lüscherz-Äussere Station, this can be explained by the

immediate topographical situation of the site which is quite steep and therefore similar to the northwestern shore, while there is no such explanation for Yvonand IV.

For sheep and goats the differences in the proportions between the sites are only small as these species are not very common in the settlements on the Jura lakes. Nonetheless the mountainous region of the Jura certainly offered good breeding conditions, which on the whole are reflected by higher proportions when compared with the settlements on the Lake of Zurich in Eastern Switzerland.

From the topographical point of view, sheep and goats are somewhat better represented during the Horgen culture at both flat shore settlements Portalban-Les Greves and Lüscherz-Neue Station "Binggeli" (n^{os} 25 and 27) than at the steep shore sites (fig. 9). At the settlements of the Lüscherz and Auvernier/Corded ware culture, the opposite occurs, although the differences in the proportions are minimal.

Bibliography

- BECKER C. and JOHANSSON F., 1981.– Die Tierknochenfunde. Zweiter Bericht. *Die neolithischen Ufersiedlungen von Twann Bd. 11*. Bern.
- BOESSNECK J., JÉQUIER J.-P. and STAMPFLI H. R., 1963.– Seeberg Burgäschisee-Süd. Band 3 : Die Tierreste. *Acta Bernensia*, 2 (3). Bern.
- CHAIX L., 1976a.– La faune de la station d'Yvonand III. *Jahrbuch der Schweizerischen Gesellschaft für Ur- und Frühgeschichte*, 59 : 61-65.
- CHAIX L., 1976b.– La faune de la fouille Yverdon-Garage-Martin. In : G. Kaenel, *La fouille du "Garage Martin-1973"*. *Cahier d'Archéologie Romande*, 6 : 181-228.
- CHAIX L., 1977.– La faune de la station de Pont-de-Thielle (Néolithique récent). *Archives scientifiques*, 30(3) : 433-464.
- CHAIX L., 1985.– Les grands traits de l'évolution des faunes de mammifères (domestiques et sauvages) du Néolithique moyen II au final au Nord-Ouest des Alpes. In : *Du Néolithique moyen II au Néolithique final au Nord-Ouest des Alpes*. Lons-le-Saunier : Musée d'Archéologie de Lons-le-Saunier et Cercle Girardot (Section d'Archéologie de la Société d'Emulation du Jura), p. 205-214.
- CHAIX L., OLIVE C., RAMSEYER D. and STUDER J., 1983.– La faune des secteurs 33 et 38 de la station néolithique Portalban/Les Grèves (civilisation de Horgen). *Bulletin de la société Frib. des Sciences Naturelles*, 72 (1/2) : 44-55.
- CLUTTON-BROCK J., 1990.– Animal remains from the Neolithic Lake Village Site of Yvonand IV, Canton de Vaud, Switzerland. *Archives Scientifiques*, 43(1) : 1-97.
- DESSE J., 1976.– *La faune du site archéologique Auvernier-Brise Lames, canton de Neuchâtel (Suisse)*. Thèse, Univ. Poitiers.
- GLASS M., unpub.– *Faunal remains from two Neolithic sites on the Bielersee*. Unpublished manuscript, Basel.
- GROSS E., 1990.– Entwicklungen der neolithischen Kulturen im west- und ostschweizerischen Mittelland. In : *Die ersten Bauern. Bd. 1 : Schweiz*. Zürich : Schweizerisches Landesmuseum, pp. 61-72.
- MARTI-GRÄDEL E., in prep.– *Archäozoologische Auswertung spät- und endneolithischer Seeufersiedlungen des Bielersees (Kt. BE, Schweiz)*. Unpublished manuscript, Basel.
- SCHIBLER J. and SUTER P., 1990.– Archäozoologische Ergebnisse datierter neolithischer Ufersiedlungen des schweizerischen Mittellandes. In : J. Schibler, J. Sedlmeier and H. P. Spycher eds., *Festschrift für Hans R. Stampfli, Beiträge zur Archäozoologie, Archäologie, Anthropologie, Geologie und Paläontologie*. Basel : p. 205-240.
- STAMPFLI H. R., 1965.– Die Knochenfunde der Grabung Vinelz 1960. *Jahrbuch des Bernischen Historischen Museums*, 45/46 : 319-320.
- STAMPFLI H. R., 1976a.– Die Tierknochen von Egolzwil 5. Osteo-archäologische Untersuchungen. In : René Wyss, *Das jungsteinzeitliche Jäger- Bauerndorf von Egolzwil 5 im Wauwilener Moos*. Schweiz. Landesmuseum, Zürich, p. 125-140.

STAMPFLI H. R., 1976b.– *Osteo-Archäologische Untersuchung des Tierknochenmaterials der spätneolithischen Ufersiedlung Auvernier-La Saunerie nach den Grabungen 1964 und 1965*. Solothurn.

STAMPFLI H. R., 1980.– Tierknochenfunde : Dokumentation. In : A. R. Furger, *Die Siedlungsreste der Horgenerkultur. Die neolithischen Ufersiedlungen von Twann 7*. Bern : Haupt Verlag, p. 141-160.

STAMPFLI H. R., 1992.– *Die Tierknochen aus den jungsteinzeitlichen Siedlungen Egozwil 3 und 5*. Archäologische Schriften 1, Luzern.

STOPP B., in prep.– *Archäozoologische Auswertung der spät- und endneolithischen Tierknochen der Seeufersiedlung St. Blaise-Bains des Dames (Kt. NE, Schweiz)*.
